

AN EVALUATION OF COMMUNICATION
AMONG CONSERVATION EDUCATION
ORGANIZATIONS IN THE BITTERROOT AND
MISSOULA WATERSHEDS : A BITTERROOT
ECOSYSTEM MANAGEMENT RESEARCH
PROJECT

**An Evaluation of Communication Among Conservation Education
Organizations in the Bitterroot and Missoula Watersheds: A Bitterroot
Ecosystem Management Research Project**

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by

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EXECUTIVE SUMMARY

The Bitterroot Ecosystem Management Research Project (BEMRP) issued a call for letters of interest to conduct a study to investigate communication among conservation education organizations in the Bitterroot Valley in 2000 in order to gain a better understanding of conservation education efforts, explore opportunities for partnering with conservation education organizations, and determine what could be done to enhance existing interorganizational communication. In the letter, they summarized their current hypotheses of conservation education and communication:

- Unconnected and uncoordinated between organizations even though they share common missions or objectives.
- Duplicative in efforts and messages; Has gaps in communications, either over time in providing information (e.g., seasonal fire prevention), or with audiences (e.g., children may be overly targeted with little provided for adults).
- No one is widely recognized as a conservation educator, rather there appears to be many organizations, which have a mission component of providing information/education.
- There is no continuously available information source, (e.g., internet) for a variety of natural resource information.

The BEMRP wanted to know if there was an existing infrastructure and what could be done to influence or help with better defining that network. I used multiple methods to address these hypotheses, which included participant observation, conservation education assessment, participatory research approach, and social network analysis.

My research findings do not support the first hypothesis that conservation education organizations are uncoordinated and disconnected in the Bitterroot Valley. In fact, both social network analysis and participant observation revealed that conservation education

organizations are highly connected and coordinated, which is at least partly due to the Bitterroot Environmental Education Partners, which formed after the BEMRP had already initiated this project.

While, the data I collected does not support the first BEMRP hypothesis, but it does support the last three hypotheses that there are a number of different organizations providing conservation programs as part of their mission, there is some duplication, and that there is no continual source of information. A few conservation education organizations, like the Montana Natural History Center and Raptors of the Rockies, exist for the primary purpose of conservation education, while conservation education is just one part of a larger mission for organizations like Lee Metcalf National Wildlife Refuge, Bitterroot National Forest, and Montana Audubon. As part of the conservation education assessment, I collected information on the various missions of each conservation education program and this data is included in Appendix I.

In order to address gaps and duplication in conservation education programs, I worked collaboratively with the Bitterroot Environmental Education Partners to develop and administer a conservation education assessment, which revealed information about the program topics, methods the programs delivered, and audiences. Data was also collected about activity type and audiences. Current conservation education programs cover over 42 different topics. Some topics, such as watershed, have a reported 50 programs that cover it, while other topics, like agriculture / farming were covered by only two programs. While the conservation education assessment portion of this report provides a

valuable first step in addressing the current state of conservation education in the Bitterroot and Missoula Watershed, it does not address how effectively the various education organizations convey information to the public.

As the BEMRP advisory group hypothesized, there is no one continual source of information available for conservation education programs in the Bitterroot and Missoula Watersheds. While almost every conservation organization has a website and / or regular newsletter, the content varies widely. Some organizations, like the Montana Natural History Center, provide up-to-date in-depth information on their websites, while other websites (i.e., Montana Audubon's) are primarily used for general description and contact information.

Based on the findings of this report, I have made the following recommendations that revolve around opportunities for collaborative work and tools to support improving relations and information flow:

- Support existing conservation education organizations with their current programming.
- Provide resources and support to existing conservation education partnerships, like the Bitterroot Environmental Education Partners.
- Financially support the Montana Environmental Education Association's effort to create an online resource directory.

The following tools were produced from this research project:

- Literature review of organizational communication and social network theory
- A model, which demonstrates how social network analysis, participant observation, and participatory research can be used to identify different organizational

communication infrastructures.

- A conservation education assessment that can be used as a planning tool for future conservation education efforts and an online conservation education resource directory that includes information about the contact information, mission, and programs offered by each conservation education organization.

The completed conservation education assessment suggests that a great variety of programs are available to a wide variety of audiences and through a number of different mediums. This completed assessment will provide valuable information for those organizations interested in filling gaps or avoiding duplication. Furthermore, the conservation education assessment was collected in such a way to form a database that is being used as a pilot region for an online Montana conservation education directory that is currently being assembled by the Montana Environmental Education Association.

Participant observation did reveal that while conservation education organizations are connected quite well throughout the Bitterroot and Missoula Watershed, that they struggle with limited funding that ultimately leads to high turnover. Additionally, the compacting factor of geographic distance means that these organizations have to be extremely resourceful to be as connected as they appear to be.

Bitterroot and Missoula conservation education organizations appear to have strong communication ties with each other. Bitterroot Environmental Education Partners, which compose a subset of the combined Bitterroot and Missoula conservation education organizations identified in this study appear to have extremely strong ties of communication among themselves. The length of ties are short, and the number of ties

are many, for all of the conservation education organizations in the study, which suggests that the conservation education community is connected well and that they could respond to new information quickly.

While social network analysis has been an effective tool at this small scale, which is concerned only with the conservation education organizations and not their audience members, expanding it to include all people who interact with all organizations would not only be a difficult and expensive, but perhaps an impossible exercise. However, in situations where the numbers of stakeholders form a discrete population (e.g. members of an organization or club), this powerful tool can be used describe the existing communication structure and identify prominent stakeholders. Participant observation and interviews can be used in conjunction with social network analysis to explain the communication structure. Together, these tools offer a strong approach to study communication infrastructure.

The Bitterroot Environmental Education Partners serves as a model for other education partnerships like those forming in Missoula and Billings. More importantly, the Bitterroot Environmental Education Partners serves as a model collaborative partnership that can succeed despite the competitive realities facing each of the partners competing individually for scarce resources. Although my original scale of interest was the Bitterroot Watershed, early successes have launched the Bitterroot Environmental Education

Partners into a regional discussion. The Bitterroot Environmental Education Partners plans to use avenues like the Montana Environmental Education statewide meetings to simultaneously present the activities and results.

INTRODUCTION

The Bitterroot Ecosystem Management Research Project, which began in 1994, was developed to address questions about the social, biophysical and management challenges of applying ecosystem management principles on U.S. National Forest lands. The BEMRP has focused specifically on the Bitterroot National Forest in western Montana and northeastern Idaho. The BEMRP Project's mission is to "strengthen the scientific theory and practice of managing Rocky Mountain ecosystems at the landscape level within the context of social, economic and ecological opportunities and constraints" (<http://www.fs.fed.us/rm/ecopartner/>). In July 2000, the BEMRP's informal advisory group responsible for Human Dimension Studies issued a call for letters of interest to conduct a study to investigate communication among conservation education organizations. In the letter, they summarized their current hypotheses of conservation education and communication in the Bitterroot and Missoula Watershed as:

- Unconnected and uncoordinated between organizations even though they share common missions or objectives.
- Duplicative in efforts and messages; Has gaps in communications, either over time in providing information (e.g., seasonal fire prevention), or with audiences (e.g., children may be overly targeted with little provided for adults).
- No one is widely recognized as a conservation educator, rather there appears to be many organizations which have a mission component of providing information/education.
- There is no continuously available information source, (e.g., internet) for a variety of natural resource information.

They also proposed the following theoretical foundations to guide the study:

- Technology transfer (understanding the value of different sources of information at different stages of awareness, trial and adoption);

- Persuasive communication (information to change or develop attitudes and behavior);
- Organizational development and change; and
- Communication theory (transferring knowledge and receiving feedback).

Essentially, the BEMRP advisory group saw a need for better coordination and connection among Bitterroot conservation education providers.

In response to this call for letters of interest, I developed an evaluative research project using a combination of quantitative and qualitative approaches that included a conservation education assessment, participatory research approach, participant observation, and social network analysis to assess the conservation education efforts in the Bitterroot Watershed, identify the current communication structure among conservation education organizations working in the Bitterroot and Missoula Watersheds, and determine the challenges and opportunities facing conservation education organizations as a whole. Conservation education organizations, and those wishing to communicate with conservation education organizations in the Bitterroot and Missoula Watersheds to address gaps and areas of duplication and improve their interorganizational communication between each other and with their audiences, will find this information useful. The conservation education organizations and their abbreviations used in this report are found in a list in Appendix II.

In fall 2000, I conducted a survey of possible methods to use in this study primarily in the field of organizational communication, and completed a literature review that concentrated on social network theory as a promising theoretical approach for the

foundation for this research project. After conducting some preliminary field work, I concluded that a participatory research approach, in addition to social network theory, would be a valuable theoretical perspective because it would benefit the local conservation education organizations.

Participatory Research Approach

Whereas positivism is characterized by the assumptions of objectivity, separation between researcher and subjects, and neutral values, participatory research makes no claim to either objectivity or neutrality and rejects researcher control over the research process. Participatory research combines joint knowledge production with a social change agenda by promoting a collective investigation of reality (Finn 1994).

Participatory research advocates promote this form of research because it acknowledges the resources of the traditional research subjects and also incorporates these subjects into the research process (Stringer 1999). The goal of participatory research is to involve stakeholders with all of the phases of the research process to the point that they contribute to: 1) defining the problem, 2) determining the appropriate methods, and 3) reporting the results (Stringer 1999). The benefit of such an approach is that it can be used to make the experiences and perspectives of ordinary people directly available to policy makers, professionals, managers, and administrators, so that more effective programs can be created and implemented. Ultimately, the goal of participatory research is to generate results that are beneficial to the community, which makes it unique when compared to most traditional research methods¹.

I used major elements of the participatory research approach throughout this study. I worked together with the Bitterroot Environmental Education Partners to generate and provide useful information throughout the project in the form of a basic conservation education assessment, grant writing, and tasks like meeting note taking. The draft mission/purpose for Bitterroot Environmental Education Partners is “a collaborative group of educators dedicated to conserving and enhancing the health of the Bitterroot Valley watershed through education and teamwork to benefit the natural resources of the valley”. The Bitterroot Environmental Education Partners modified the conservation education survey, helped collect the data, and provided feedback and suggestions with the results, which are characteristics of participatory research project. However, I also developed social network analysis research component, independent of the Bitterroot Environmental Education Partners, which did not have any characteristics of participatory research. I did not request or receive feedback from the Bitterroot Environmental Education Partners about survey design, data collection, or data results. While many of the conservation education organizations will review this report, the researcher, alone, created it. For more information about participatory research and how it relates to community forestry, please see the U.S. Community Forestry Research Fellowships Program that is sponsored by the Ford Foundation and housed out of Berekeley http://www.cnr.berkeley.edu/community_forestry/index.html. This program also supported this project.

Social Network Analysis

Social network analysis is the other principle theoretical component of this study, and has

been described as a branch of social and behavioral science that tries to understand the complex structures that evolve from the many social ties of an individual. Social network theory was selected to as a way to determine the connectedness of conservation education organizations in the Bitterroot Watershed. Hanneman (2000) suggested that social network analysis is more of a branch of “mathematical” sociology that treats data as deterministic, making the decision to treat the relations measured to be the “real” or “final” relations (Hanneman 2000).

Social network analysis has been used on a variety of topics, from the position of the Medici family in Florence, to the activities of economic elites, which influences how people get jobs. Wasserman and Faust (1994) describe social network analysis as an important structural analysis approach where the analysis is based on relationships, and on the patterns and implications of those relationships. They also stated that the purpose of social network analysis is to understand the properties of the social (economic or political) structure environment and how those structural perspectives influence observed characteristics.

Actors (nodes) and relations (ties) are the two primary parts of social network data. Unlike conventional social data analysis that focuses on the actors and attributes, social network data analysis focuses on the actors and relations (Hanneman 2000). Network data usually contains actors that fall within some natural boundary, like a class or organization, and they often include all actors of the defined population (full network data) instead of a sample (Hanneman 2000). This type of census data also means that

network data cannot be independently sampled, instead network data is often collected using methods like snowball sampling (Hanneman 2000). Full network methods, where relations are collected about each actor, are needed to properly define and measure many of the structural concepts of network analysis. Most network datasets contain information about only one type of relation (Hanneman 2000).

The identification of the “most important” or “prominent” actors in a social network is one of the primary purposes of social network analysis (Wasserman and Faust 1994). A prominent actor is typically defined by whether or not the ties of the actor make the actor visible to the other actors in the network. The prominence of the actor to others is not only measured by direct and adjacent ties, but also intermediaries and their indirect paths (Knoke and Burt 1983; Hubbell 1965; Friedkin 1986; Wasserman and Faust 1994).

However, further investigation reveals that this definition of prominence is actually rather vague. Are prominent actors the objects of many “choices” from followers, while non-prominent actors (or followers) are not? What properties of these choices make an actor more visible than the other actors or the “object of” many ties? And what about indirect choices? This definition is also relative to the nature of “choices” made by other actors. Prominence is difficult to quantify, since many actor indices that are function of just the i th row and column of the sociomatrix would qualify as measures of prominence. To allow researchers to define better the important actors as those with more visibility and to understand better the meaning of the concept, Knoke and Burt (1983) have distinguished between two types of prominence – centrality and prestige.

A central actor is one that is extensively involved in relationships with other actors, which makes that actor more visible to other actors. Whether this prominence is due to the receiving (being the recipient) or the transmission (being the source) of many ties is not relevant, what is important is that the actor is highly connected with others. A prestigious actor is one who is the object of extensive ties, thus the focus is solely on the actor as a recipient. The prestige of an actor increases as the actor becomes the object of more ties but not necessarily when the actor itself initiates the ties (Knoke and Burt 1983).

One of the strengths of the social network analysis is the rigorous mathematical definitions applied to the actors and their relationships, such as prominence, prestige, isolation, popularity, clique, group, social position, social role, closely knit networks, and web of relationships (Wasserman and Faust 1994). Like any theoretical framework, there are a number of challenges when implementing social network analysis. The major difficulties of this approach include defining network boundaries as well as sampling (Wasserman and Faust 1994). Once these challenges are overcome, social network analysis can be a useful tool in defining the communication structure of a particular network, indicating the reciprocity, mutuality, balance, and transitivity characteristics of that network.

Objectives

The objectives of Phase I of this project address the four hypotheses put forth by the BEMRP advisory group. I accomplished this by 1) developing a baseline assessment of

programs offered by topic, audience, and activity type in the Bitterroot and Missoula Watersheds in order to determine areas of low and high representation, 2) determining the communication structure between the conservation education organizations working in the Bitterroot and Missoula Watersheds, and 3) experimenting with social network analysis as a tool for capturing the communication among conservation education organizations and assessing the practicality of applying such a method to both conservation education organizations and their audiences.

STUDY AREA

The Bitterroot Watershed is primarily located in Ravalli County in western Montana, covers approximately 2,500 square miles of which, the U. S. Forest Service owns more than 70% of the watershed, and includes the communities of Sula, Darby, Hamilton, Stevensville, Corvallis, Victor, Florence, Lolo, and Missoula. The watershed begins at the Bitterroot Mountains on the west and the Sapphire and Anaconda-Pintlar ranges on the eastern edge of the basin. One of the central features of the Bitterroot Watershed is the 60-mile long, free flowing Bitterroot River that includes the primary tributaries of the East and West Fork, and the Burnt Fork, Lost Horse, Lolo and Skalkaho Creeks tributaries. The Bitterroot River provides almost one third of the total flow of the Clark Fork downstream from the confluence, making it an important tributary of the Upper Clark Fork Sub-Major Basin and the greater Columbia River Basin. The forests are composed of tree species such as ponderosa pine, subalpine fir, Englemann spruce, whitebark pine, alpine larch, grand fir, western red cedar, lodgepole pine, western larch and even-aged Douglas-fir. Nearly all of the watershed's approximately 35,000

inhabitants reside in this wide valley, a place defined by small towns, subdivisions, ranchettes, and family farms (Bitterroot Watershed Business Plan 2001).

One of the most striking characteristics associated with the Bitterroot Watershed is the growth rate. The Bitterroot Watershed human population increased 44% over this past decade, making it one of the fastest growing areas in the country. Ground water loss, lower water quality, invasive plant species, river access, stream channelization, and habitat conversion are just some of the issues associated with this high growth rate. In addition to the growth issues facing the Bitterroot Watershed, communities are still recovering from a record fire season in 2000 in which more than 350,000 acres of the watershed burned. The combination of logging and a decades of fire suppression has resulted in a increased abundance of even-aged Douglas-fir stands that have made the forests vulnerable to the type of fire the Watershed experienced during the 2000 fire season. Despite the burning of over 350,000 acres, fuel loads remain high (Bitterroot Watershed Business Plan 2001).

Conservation Education Organizations – History of the Bitterroot Environmental Education Partners (BEEP)

In February 8th, 2000, a new actor in the Bitterroot conservation education community called a meeting to introduce themselves to the community, learn about what the different organizations emphasized, and actively begin laying down the groundwork of an education partnership similar to one they had been involved in during a previous job. What would become the Bitterroot Environmental Education Partners met again February

22 and March 13th. The primary purpose of these initial meetings was to share calendars of upcoming events, discuss planned partnership activities like teacher's workshops, and discuss the long-term purpose of having an education partnership. The group began to splinter because almost all of the organizations have extremely busy spring schedules, personalities, and varied opinions regarding how time should be spent at the meetings. Some members wanted to spend time developing a mission, while others did not want to spend their time, at least at that point in time, working towards this goal.

Spring 2000 came and went, and the future of Bitterroot Environmental Education Partners was uncertain. The original actor that spearhead the group was not permanently hired and soon left the Bitterroot Watershed for other employment. At the same time, a separate, but related initiative that has become known as the Bitterroot Watershed Partnership was starting to form as one of the Large-Scale Watershed Restoration Projects sponsored by the U.S. Forest Service. My involvement as an economist was requested by some of the early leaders of this new partnership. Several of us encouraged the involvement of the Bitterroot Environmental Education Partners members to this larger partnership because education and communication are one of the four main objectives (please see <http://www.bitterroot.net/wforum/Bitterroot%20Watershed%20Partnership.htm> for more information about the Bitterroot Watershed Partnership).

Acceptance into the Large-Scale Watershed Restoration Project allowed the Bitterroot Watershed Partnership to compete for up to \$3 million dollars a year for 5 years. While individual education partners received over \$40,000 The Bitterroot Partnership received initial funding of \$130,000 of which \$5,400 was to be allocated specifically to Bitterroot

Environmental Education Partners. Since all of the education projects submitted could not be supported by the \$5,400, an emergency BEEP meeting was called to write a proposal for the grant money. This proposal for a small amount of money was the turning point for Bitterroot Environmental Education Partners. They met at a river access and hammered out the proposal, determined who would be responsible for supervising the community education workshops sponsored by the partners, and discussed the idea for a 5-year watershed education plan for the Bitterroot Watershed.

The most recent Bitterroot Watershed Partnership proposal included over \$100,000 of Bitterroot Environmental Education Partners-sponsored projects as well as several other individual education projects. Bitterroot Environmental Education Partners is in the process of combining a position with Audubon to hire a part-time coordinator to run Bitterroot Environmental Education Partner's community education program. At this time, no information is available about how much funding the Bitterroot Environmental Education Partners or Bitterroot Watershed Partnership will receive this year under the Large-Scale Watershed Restoration Program.

Other similar education partnerships are forming elsewhere around Montana, like in Missoula and Billings. One of the Bitterroot Environmental Education Partners is now a regional representative for the state Montana Environmental Education Association. Bitterroot Environmental Education Partners will make collective presentations at this year's annual Montana Environmental Education Association meeting. We are working with the state director of Montana Environmental Education Association to secure

\$15,000 of grant funding to develop a state-wide searchable online directory for the State of Montana using the education assessment data collected for this project.

I primarily focused on conservation education programs in the Bitterroot Watershed that included the following organizations: Bitterroot Ecological Awareness Resources (BEAR), Bitterroot Audubon (BA), Bitterroot National Forest (BNF), Lee Metcalf National Wildlife Refuge (LMNWR), Montana Audubon (MA), Teller Wildlife Refuge (TWR), and Raptors of the Rockies (RR). Although dozens of other organizations participate in conservation education activities and support individual programs, I decided to spend the first year working with organizations where conservation education was a primary focus of their program. Within the year and a half that I have been involved with these groups, drastic changes in personnel have occurred. Lee Metcalf National Wildlife Refuge recently filled a long-time vacant position of recreation planner, in the aftermath of the fires of 2000, the Bitterroot National Forest created and filled a conservation education position, and Bitterroot Ecological Awareness Resources lost their executive director.

METHODS

No one method could adequately address all of the hypotheses that the BEMRP advisory group identified. Therefore, I used multiple approaches to address as many of their hypotheses as possible, which is commonly done in evaluative research (Guba and Lincoln 1989; Patton 1990). Multiple approaches allow researchers to overcome limitations encountered with using anyone method and increase the overall validity of the evaluation (Patton 1990). Therefore, I used both quantitative and qualitative approaches, primarily in the form a conservation education assessment, participant observation, participatory research approach, and social network analysis to address the four hypotheses.

BEMRP Hypotheses	Appropriate Method
Unconnected and uncoordinated between organizations even though they share common missions or objectives.	<i>Primary:</i> Social Network Analysis <i>Secondary:</i> Participant Observation and Conservation Education Assessment
Duplicative in efforts and messages; Has gaps in communications, either over time in providing information (e.g., seasonal fire prevention), or with audiences (e.g., children may be overly targeted with little provided for adults).	<i>Primary:</i> Conservation Education Assessment
No one is widely recognized as a conservation educator, rather there appears to be many organizations, which have a mission component of providing information/education.	<i>Primary:</i> Social Network Analysis <i>Secondary:</i> Participant Observation and Conservation Education Assessment
There is no continuously available information source, (e.g., internet) for a variety of natural resource information.	<i>Primary:</i> Participant Observation <i>Secondary:</i> Conservation Education Assessment

Conservation Education Assessment

The primary objective for the education assessment was to determine the areas of potential topics and/or audiences that were most (>15) or least represented (<5). All descriptive statistics are reported as mean and standard deviation ($\bar{x} \pm SD$)

I used a participatory research approach to conduct the conservation education assessment. Participatory research advocates working with the community to conduct the research and providing a practical outcome to the community. Hence, using this approach, I was not only studying communication among conservation education organizations, I was actively trying to improve communication. With input from the Bitterroot Environmental Education Partners, I adapted the survey from one used by WestEd organization to develop an online-resource directory for the state of California <http://www.creec.org/> (Appendix III). The California Regional Environmental Education Community (CREEC) directory is a statewide database of conservation education resources that provides teachers and others with easy access to information about museums, zoos, nature centers, educational institutions, etc. It also includes information about specific environmentally relevant curriculum guides, publications, field trips, docent-led tours, assembly programs, service-learning projects, grants, and so forth. Directory users are able to search by program type, topic, academic discipline, location, grade, keyword, and more. In addition to obtaining information about specific programs, this survey inquires about the types of resource activities, audience, and topics addressed.

The idea behind using this existing survey was not only to help identify basic questions that The BEMRP advisory group had asked about organizations, missions, activities, etc. (e.g. What are their objectives? What aspects of the natural environment do they cover? What audiences do they serve?), but also to collect information that could be used to develop an online Montana conservation education directory that most likely would lead to improved communication among conservation education organizations and their audiences. At one of the 5-year planning meetings, the Bitterroot Environmental Education Partners were given the opportunity to modify the original survey so that specific information (e.g., what other conservation education organizations in Missoula should be surveyed) could be gathered. This data from the conservation assessment is available on a MS Access database from the Montana Environmental Education Association, BEMRP, or the author for public use and will be used by the Montana Environmental Education Assessment to create a regional database of the programs offered by conservation organizations in the Bitterroot and Missoula Watershed.

Participant Observation

Whereas participatory research refers to a general research approach that can be associated with almost any method, participant observation is a specific method. One of my primary methods of gaining information was in the form of participant observation. Participant observation is used in research that involves an interaction between the research and the subjects about situations specific to the subjects. Data are systematically collected and supplemented with observations, notes, and documents (Taylor and Bogdan 1998). Participant observation can be used to supplement the other methods by providing

possible explanations for patterns or relationships.

Social Network Analysis

I performed a social network analysis on the structure of conservation education organizations interorganizational communication structure using the social network analysis software UCINET (Borgatti et al. 2000) and graphing package NetDraw (Borgatti 2000). The BEEPMEEP dataset contains 15 conservation organizations identified by the Bitterroot Environmental Education Partners and the other conservation education organizations they regularly communicated with at initial meetings to develop an education plan² for the Bitterroot Watershed in summer of 2001. The BEEP dataset contains only the 7 organizations that were actively involved with the Bitterroot Environmental Education Partners in the summer of 2001. A representative from each organization was asked, “Do you communicate with this organization?” and “Which organization do you communicate with most?” Each organization or actor was asked to rank his or her responses (Appendix IV). I collected additional data to perform a repeated measures analysis or longitudinal analysis to determine how the ties in the network changed over time for the BEEP dataset only.

Since social network analysis is not a common approach familiar to the BEMRP advisory group nor the personal of the Bitterroot National Forest, I have provided definitions of the most common social network analysis statistics which have been adopted from the “Social Network Analysis: Methods and Applications” by Stanley Wasserman and Katherine Faust (1994), and “Introduction to Social Network Methods” by Robert

Hanneman (2000). Please see either of these texts for a more detailed discussion of these ideas.

Adjacency Matrix– Social network analysis data differs from traditional social data in that the data is displayed in a square array of measurements of an adjacency matrix. All of the matrices are arranged in a way where the vertical column represents the “sender” and rows at the top of each table represent the chooser’s “receiver”. In other words, the rows represent the source of directed ties, and the columns the targets. Making comparisons by columns shows us the degree of similarity or dissimilarity of those who are chosen by others, whereas rows allows us to make comparisons with each actor in terms of who they chose (Wasserman and Faust 1994; Hanneman 2000).

Density – Density measures the proportion of ties that could be present providing an idea of how close a network is to realizing full potential. Mean density refers to the mean strength of ties across all possible ties, while standard deviation refers to a measure of how much variation there is among the actors. No variation would occur if all of the values for all of the actors were either zero or one. Maximum variation for binary data occurs with a density of 0.50. In other words, as density approaches either zero or one, the standard deviation and variation in ties declines (Wasserman and Faust 1994; Hanneman 2000).

Row Density – I can distinguish between ties sent and ties received when the data is asymmetric with directed ties. The density for each row and column shows how the

actors are embedded in the network, the potential to be influential or powerful, and the potential speed at which information is likely to flow through the network. The sum of connections from one actor to others is called the out-degree of the point. The out-degree of the point is one measure of how many connections the actor has to other actors.

Another way of thinking of out-degree of the point how influential or prestigious the actor may be with other actors. The more ties and actor has with other actors means the potential of that actor to be influential is high (Wasserman and Faust 1994; Hanneman 2000).

Column Density - While row density measures the source of information, column density measures which actors are the receivers or sinks of information. As is the case with row density, the sum measure for column density measures is the in-degree of the point, or how many other actors send information or ties to the actor in question. Actors that receive information from many sources may also be more powerful- to the extent that knowledge is power (Wasserman and Faust 1994; Hanneman 2000).

Distance – If two actors are adjacent the distance = 1. If actor A tells actor B and actor B tells actor A then there is a distance of 2. Distance is an important macro-characteristic of the network as a whole (Wasserman and Faust 1994; Hanneman 2000).

Geodesic distance is the number of relations in the shortest possible walk from one actor to another (Wasserman and Faust 1994; Hanneman 2000).

Geodesic path – the geodesic path(s) is often the “optimal” or most “efficient” connection between two actors (Wasserman and Faust 1994; Hanneman 2000).

Maximum Flow– Maximum flow asks how many different actors in the neighborhood of a source lead to pathways to a target. If I need to get a message to you, and there is only one other person I can send this message through, my connection is weak, even if the person I send it to may have many ways of reaching you. If on the other hand there are four people to whom I can send my message, each of whom has one or more ways of transmitting my message to you, then my connection is stronger (Wasserman and Faust 1994; Hanneman 2000).

RESULTS

Conservation Education Assessment

Conservation education programs varied widely by topic (Figure 1) (24.12 ± 14.77 , $n = 41$). Topics that are the least represented by conservation education programs include ozone depletion ($n = 5$), technology and society ($n = 5$), agriculture / farming ($n = 6$), transportation ($n = 8$), and air ($n = 9$). Topics that were represented by the most number of programs included: plants and animals ($n = 55$), watershed ($n = 50$), nature awareness ($n = 49$), stewardship ($n = 46$), natural resource management ($n = 44$), and forest ($n = 44$). Approximately the same numbers of conservation education programs are available to individuals of all ages (Figure 2) (37.00 ± 9.09 , $n = 18$). Teachers ($n = 46$), 5th ($n = 46$), and 6th ($n = 48$) grades have the most programs available to them. The fewest conservation education programs are available to individuals under the age of 5 ($n = 9$). Conservation education programs tended to be less equally distributed by activity (Figure 3) (15.65 ± 10.21 , $n = 26$). The least common activity by programs was a residential outdoor school ($n = 0$), while the most common activity was a field trip ($n = 45$).

I summarized the data from the conservation education assessment in the following manner: number of programs by conservation education topic and audience (Table 1), number of programs by conservation education topic and audience (Table 2), and number of programs by conservation education topic by activity type (Table 3). At the suggestion of one of the Bitterroot Environmental Education Partner's members, I also created a contour map that displays conservation education topics by audience (Figure 4).

Participant Observation

My participant observation revealed that conservation education organizations working in the Bitterroot and Missoula Watershed are affected by four main factors: uncertain funding; high employee turnover, past politics, and distance and physical geography.

1) Inadequate or Uncertain Funding

Although everyone working in the field of natural resources and the environment knows the reality of inadequate or uncertain funding, conservation education organizations receive relatively little funding relative to other fields within natural resources like management and research.

2) High Rate of Employee Turnover³

High employee turnover has contributed to some of the communication struggles seen between the Bitterroot and Missoula education organizations. Within the time of this project I have seen a new recreation specialist at Lee Metcalf National Wildlife Refuge, loss and gain of a conservation education coordinator for the Bitterroot National Forest, loss and gain of a program director at the Montana Natural History Center, loss of the executive director of Bitterroot Ecological Awareness Resources, and loss of the education position at the Rocky Mountain Elk Foundation. This type of uncertainty can pose serious hurdles for achieving long-term interorganizational education partnerships that are needed to work on large collective projects like joint programs, long-term planning, and education centers.

3) Past Politics

Past politics have an obvious impact about which conservation education organizations communicate and cooperate with each other. While there has been a significant influx of people moving into conservation education positions in the Bitterroot and Missoula areas over the past several years, there is a fundamental core of individuals that have been involved with conservation education efforts several years. Understanding the relationships among these individuals are a key factor to understanding which conservation education organizations work or do not work together. Thus, past experiences, both good and bad have contributed to the current conservation education communication structure that exists today.

4) Distance and Physical Geography

One of the qualities that attract so many individuals to the Bitterroot Watershed is the vast open spaces and distances between towns. This very distance is one of the key obstacles many groups face. For example, early in the formation of BEEP, the individuals representing the organizations debated about whether or not to actively seek out educators from Missoula to invite up the Bitterroot for the Bitterroot Environmental Education Partners monthly meetings. The group reached a consensus that it was too far to drive on a monthly basis and decided to work towards arranging a meeting 1-2 times a year with conservation education organizations in Missoula.

Social Network Analysis

Bitterroot and Missoula Watershed Conservation Education Organizations

The BEEPMEEP (Table 4) and BEEP (Table 5) dataset are asymmetric matrices where

only one relation was measured. The BEEPMEEP dataset consists of a 15 x 15 matrix of conservation education organizations in the Bitterroot and Missoula Watershed, while the BEEP dataset consists of a 7 x 7 matrix of conservation organizations in the Bitterroot Watershed.

Random configurations of the BEEPMEEP (Figure 5) and BEEP (Figure 6) dataset reveal that both networks have many ties (the arrows represent the direction of the ties). For example, the National Wildlife Federation report communicating with the Bitterroot National Forest, but the Bitterroot National Forest does not report communicating with the National Wildlife Federation (Figure 4). It is also possible to distinguish between actors that have few and many communication ties by visually assessing the graph. For example, the Bitterroot Audubon and Raptors of the Rockies have much fewer ties than Lee Metcalf National Wildlife Refuge or the University of Montana. Because the BEEP dataset is a fully saturated network, every actor has a two-way communication tie with every other actor.

Adjacency – The main difference between this dataset and a conventional social science dataset is that the columns describe the relationship between the actors instead of attributes of the actors. Because both BEEPMEEP (Table 4) and BEEP (Table 5) datasets contain directed ties, they are referred to as asymmetric. Just because one actor reports communicating with another actor does not mean that the relationship works in reverse. For example, the National Wildlife Federation reports communicating with the Bitterroot National Forest, but the Bitterroot National Forest does not report

communicating with National Wildlife Federation (Wasserman and Faust 1994; Hanneman 2000).

The BEEPMEEP dataset contains 15 rows and 15 columns of binary data (0 represents no tie; 1 represents presence of a tie) (Table 4). Smaller datasets are much more amenable to this visual check than larger datasets. Because every actor in the BEEP dataset did communicate with the other Bitterroot Environmental Education Partner actor, I was able to collect full-rank ordinal measures of relations (1 = highest (yourself), 7 = lowest, a value can only be used once) (Table 5). Full-rank ordinal measure of relations measures the “difference in degree of intensity, but not necessarily equal differences”. In other words, the difference between the second and third choice may not be the same as the difference between the third and fourth choice (Hanneman 2000).

Density – The BEEPMEEP dataset is not a fully saturated network, whereas the BEEP dataset is a fully saturated network. Fully saturated networks, where all logically possible ties are actually present, are uncommon and generally only occur in relatively small datasets like the BEEP matrix where only a few actors are present. The density for the BEEPMEEP matrix that contains all of the organizations was 0.76 with a standard deviation of 0.43 (Table 6). Because the BEEP dataset is a fully saturated network, the density for the matrix was 1.0 and the standard deviation of 0.0 (Table 6).

Row Density – The row density analysis reveals what role each actor plays in being the source of ties (Table 7). The sum refers to the number of out degree. For example

University of Montana and Lolo National Forest report communicating with every organization, while the Raptors of the Rockies report communicating with only seven organizations.

Column Density – Whereas, row density reveals the source of the ties, column density measures which organizations are the receivers of information. The sum refers to the in-degree of the point, which is how many other actors send information or ties to the other organizations. The University of Montana ($n = 15$), Teller Wildlife Refuge ($n = 14$), Lee Metcalf National Wildlife Refuge ($n = 14$), and the Montana Audubon ($n = 14$) received the most ties from other conservation education organizations. Missoula Outdoor Learning Adventures ($n = 6$), Lolo National Forest ($n = 7$), and National Wildlife Federation received the least ties. Making comparisons by columns shows us the degree of similarity or dissimilarity of those who are chosen by others, whereas rows allows us to make comparisons with each actor in terms of who they chose (Wasserman and Faust 1994; Hanneman 2000).

Geodesic Distance – The distance between two actors refers to the length of the path between them. If two actors are adjacent the distance equals one. Distance is an important macro-characteristic of the network as a whole. If Lee Metcalf National Wildlife Refuge tells Montana Audubon and Montana Audubon tells Teller Wildlife Refuge, there is a distance of 2 (Tables 9, 10). When the diagonal and direct paths are removed (Tables 10, 11), it is readily apparent that no one has more than a geodesic distance of 2 from the other actors.

Geodesic path – If there are many efficient paths connecting two actors, the odds are improved that a signal will get from one to another. One index of this is a count of the number of geodesic paths between each pair of actors. Because the network is dense and connected, it is no surprise that the geodesic path distances are small and that information probably travels very quickly (Table 11). Pathways of one have been deleted in this table to accentuate the paths greater than one.

Maximum Flow—The maximum flow approach suggests that the strength of tie from one actor to another is no stronger than the weakest link in the chain of connections. The connectedness of a graph as a whole is best thought as involving all connections – not just most efficient ones (Wasserman and Faust 1994; Hanneman 2000). All actors for the BEEPMEEP matrix have multiple pathways to send information to all other actors. At the very least Missoula Outdoor Learning Adventures only have five pathways to most other actors, whereas Montana Audubon ranges from six to thirteen, which is more typical of the rest of the actors (Table 12).

Longitudinal Analysis

One of the legitimate concerns of quantitative survey data like social network analysis is that it captures one moment in time and simplifies something extremely complex, like communication, into a numbers. Hence, I felt that it was important to capture more than one time period. In fall 2002, the Bitterroot Environmental Education Partners were resurveyed using the same questions as the previous fall (Table 13). Table 14 is the

difference between the fall 2001 and the fall 2002 survey. Zeros represent no change.

While there has been some change in communication structure, this change has been minimal. Of 42 possible changes, 9 actors reported no changes from the previous survey and 24 reported only a change of one. The Bitterroot National Forest is the recipient of the most changes in communication structure. This change can be attributed to the fact that the conservation educator for the Bitterroot National Forest had recently began the position when the first survey was administered was not as connected as they are now.

DISCUSSION

In the following discussion section, I address whether and how the research findings supported each of the BEMRP advisory group hypotheses. In most cases, the results from this study have supported the BEMRP advisory group's hypotheses, with the exception of the first hypothesis about connectivity and coordination. Next, I briefly discuss these findings in relation to the BEMRP advisory group's objectives for this study. I conclude this section with a discussion about recommendations that can be made from this study.

BEMRP Hypothesis 1 - Unconnected and uncoordinated between organizations even though they share common missions or objectives.

My research findings do not support the idea that conservation education organizations are unconnected and uncoordinated. Several social network analyses of distance, transitivity, geodesic distances and paths, and maximum flow all support the assertion that conservation education organizations that are part of the Bitterroot Environmental Education Partners are extremely connected and coordinated and that conservation education organizations throughout the Bitterroot and Missoula Watersheds are highly connected. A quick visual assessment of the BEEP dataset reveals all actors are well connected, but that many of the Bitterroot Environmental Education Partner's organizations communicate with Bitterroot Environmental Awareness Resources and Raptors of the Rockies the least (Table 5).

Density - The density for the BEEPMEEP matrix that contains all of the organizations was 0.76, which means that 76% percent of all possible ties are present. The standard deviation of 0.43 indicates that there is a great deal of variation among the ties. Both

these measures indicate high levels of communication among conservation education organizations in the Bitterroot and Missoula Watersheds. Because the BEEP dataset is a fully saturated network, the density for the matrix was 1.0 and the standard deviation of 0.0, meaning that every conservation education organization is communicating with every other conservation education organization, which suggests that they are extremely connected.

Row and Column Density - The row and column density provide information about which organizations are sending and receiving the most ties. The actors that sent the most ties were high senders like may be communicators or facilitators like University of Montana and the Lolo National Forest. The actors that received the most ties were The University of Montana ($n = 15$), Teller Wildlife Refuge ($n = 14$), Lee Metcalf National Wildlife Refuge ($n = 14$), and the Montana Audubon, respectively. These actors are considered “prestigious” in that other actors want to be known by the actor, so they send information to them and possibly more powerful than actors that receive few information. One explanation for the fact that The University of Montana sends and receives ties to every actor is because this institution has multiple people working in numerous departments throughout the University involved the conservation education efforts throughout the Bitterroot and Missoula Watershed. I would recommend distinguishing between the different the departments in any follow up survey work to distinguish among the different people and or departments at the University of Montana. For example, the other three high receivers of information are only represented by one to two people and interestingly enough are all part of the Bitterroot Environmental Education Partners. This suggests

that conservation education organizations in the Bitterroot Watershed play a significant role in communication throughout the Bitterroot and Missoula Watershed.

Geodesic Distance – All actors are reachable from all others. For each actor, that actor's largest geodesic distance is called the eccentricity – a measure of how far an actor is from the furthest other. Because the current network is fully connected, a message that starts anywhere will eventually reach everyone. Distance that is quite small suggests that information is likely to travel quickly and reach everyone. The short distance and diameter for the BEEPMEEP matrix suggests that messages will reach every actor quickly.

Geodesic Paths - While every actor is connected, there are some actors that are less connected with other actors. For example, the Watershed Education Network to Bitterroot National Forest has a path of nine, indicating less connectivity. Most of the geodesic connections among the education organizations are not only a short distance, but there are very often multiple shortest paths from one actor to another actor. This pattern suggests that information flow is resilient and that it will be difficult for any one actor to exert a disproportionate amount of power over other actors because most actors have alternative efficient ways of connection to other actors that can by-pass any given actor.

Maximum Flow - All actors for the BEEPMEEP matrix have multiple pathways to send information to all other actors. At one end of the spectrum, the Montana Outdoor

Learning Adventures only have five pathways to most other actors. Alternatively, Montana Audubon ranges from six to thirteen, which is more typical of the rest of the actors (Table 13). Thus, all of the BEEPMEEP actors have strong links, which suggests that information travels through multiple pathways.

Unlike the assertion of the BEMRP advisory group, overall this meso-scale analysis of density and other social network analysis indicators suggest that conservation education organizations in the Bitterroot and Missoula Watersheds are very connected, which is in agreement with my participant observation. There are several possible explanations for these findings. First, the Bitterroot Environmental Education Partners did not exist when the BEMRP advisory group formed these hypotheses. The Bitterroot Environmental Education Partners formed after shortly after this research project began. Additionally, the Bitterroot Environmental Education Partners certainly did not exist or have the support of a part-time coordinator position or previous to my support as a researcher. Another explanation is that conservation education organizations have always been extremely connected, but not necessarily connected with people who serve on the BEMRP advisory committee. Nevertheless, there is no way to determine if the conservation education organizations are more or less connected before the Bitterroot Environmental Education Partners formed and when BEMRP developed their hypotheses.

Limitations of Social Network Analysis

Experts in the social network analysis field admit that much of the research conducted to date has contributed little insight into human behavior because most of the results have not been applied, or were conveyed using confusing terms and concepts, and are generally over mathematical (Rogers and Kincaid 1981). Additionally, the limited available software is not easy to learn.

In my study developing somewhat arbitrary definitions of which organizations offer conservation education or conservation advocacy was difficult. An additional challenge was capturing every conservation organization that may offer one conservation education program on an annual basis that could then change annually. Furthermore, in order to determine the strength of the relationships requires a complete matrix where each organization communicates with the other organization and can rate the quality of that communication. In this study, there are potentially hundreds of organizations in the Bitterroot and Missoula communities that offer some sort of conservation education program at least once a year. However, all of these organizations do not know and/or even communicate with each other. Even if I were able to develop a criteria for identifying every single organization, which may or may not differentiate between conservation advocacy and education, the project would be logistically impossible because each organization does not communicate with every single other organization.

BEMRP Hypothesis 2 - Duplicative in efforts and messages; Has gaps in communications, either over time in providing information (e.g., seasonal fire prevention), or with audiences (e.g., children may be overly targeted with little provided for adults).

The conservation education assessment was the primary method to address BEMRP

Hypotheses 2. There is definite duplication in efforts and messages by topic and audience. For example, 50 programs have been identified that address the topic of watershed. Each age, on average has access to 26 programs that address the topic of watershed. Children under kindergarten have the fewest programs that address the topic of watershed available to them at five, while 6th graders have the most programs available to them at 36 programs. Adults have 26 programs available to them. However, whether or not this is too much duplication or not enough duplication is a difficult question to answer because this assessment did not determine the effectiveness of the various education programs, nor did it determine whether or not these programs are meeting objectives of conservation education across a large-scale. How many programs should be offered in watershed education in the Missoula and Bitterroot Watersheds? What percentage of the population should be targeted? What ages should these programs target? Who should decide what these landscape-scale conservation education objectives should be for the watersheds? There are not easy or correct answers to these questions. What the large-scale conservation education goals should be for the watershed needs to be negotiated among the conservation education providers, public, agencies, teachers, and any other interested parties. One way to do this is for organizations to form informal partnerships and memorandums of understanding among each other. In addition to

myself, two Bitterroot Environmental Education Partners served on a larger Bitterroot Watershed Partnership as steering committee members. Education has been identified as one of the four main objectives for the Bitterroot Watershed Plan. Having people cross-over from an education partnership to a larger watershed partnership is an example of one way to begin this dialogue with a broader audience about what role the conservation education should play in the Bitterroot Watershed.

The education assessment survey provides information on topic, audience, and activity type like that for the topic of watershed for 15 different conservation education assessments in the Bitterroot and Missoula Watershed. This assessment should be used as a baseline of information that identifies what topics, audiences, and types of activities conservation education programs cover in the Bitterroot and Missoula Watersheds. The education assessment will also provide the information needed to develop an online Montana conservation education directory. For future surveys, some of the Bitterroot Environmental Education Partner members are interested in making a distinction between audiences after the age of 18 in order to determine the programs offered to individuals greater than 55 years of age.

BEMRP Hypothesis 3 - No one is widely recognized as a conservation educator, rather there appears to be many organizations, which have a mission component of providing information/education.

While there are a few organizations with a primary conservation education mission, such as the Montana Natural History Center, Raptors of the Rockies, Watershed Education Network, and Missoula Outdoor Learning Adventures, my research supports the

hypothesis that there are many organizations that have education as at least some component of their mission. This is the case for University of Montana, Lee Metcalf National Wildlife Refuge, Bitterroot National Forest, Montana Audubon, and Teller Wildlife Refuge. The University of Montana, Montana Natural History Center, and Lee Metcalf National Wildlife Refuge appear to be the conservation education organizations that received and send out the most communication messages to other conservation organizations.

While no one organization is widely recognized as a conservation educator, the Bitterroot Environmental Education Partners is recognized as a strong conservation education partnership outside of the conservation education community in the Bitterroot and Missoula Watersheds. For example, when the Bitterroot Watershed Partnership wanted to allocate monies to education, they allocated money to the Bitterroot Environmental Education Partnership instead of the any one individual organization. Then, the Bitterroot Environmental Education Partners collectively decided the most appropriate way to allocate those monies.

While the Bitterroot Environmental Education Partners appears to still be a strong functioning partnership, the Missoula Environmental Education Partners appears to be fading. The reasons for the different successes of these partnerships were not an objective of this study and go well beyond the scope of this study. However, when a group of organizations can form even a loose informal partnership to share information and support each other's programs can lead better coordination, communication, and a

larger vision for conservation education for watersheds. Hence, one of the main recommendations of this study is to continue supporting conservation education partnerships like the Bitterroot Environmental Education Partners.

BEMRP Hypothesis 4 -There is no continuously available information source, (e.g., internet) for a variety of natural resource information.

My research supports the assertion that there is no ‘collective’ continuously available information source of information for natural resource information. Most conservation education organizations do have websites (e.g. Bitterroot National Forest, Lee Metcalf National Wildlife Refuge, Montana Natural History Center, Teller Wildlife Refuge, Montana Audubon, Raptors of the Rockies) and regular newsletters. Websites such as that maintained by the Montana Natural History Center are extensive and provide up-to-date information about programs, while other sites, like Montana Audubon’s, are used primarily for providing contact and general information. The Bitterroot Environmental Education Partners have attempted to develop a brochure that would provide a general description of each of their programs.

I do support the Montana Environmental Education Association’s efforts to launch an online Montana conservation education directory and have provided data from this project to pilot the Bitterroot and Missoula Watershed. I do not support the idea of creating a paper directory, which is both expensive becomes quickly out dated. For example, in the year since I collected data on specific conservation education programs, both the Rocky Mountain Elk Foundation and National Wildlife Federation have

dissolved their programs. A well-staffed online directory is a less expensive method that can accommodate these major changes and, therefore, provide more accurate information than a paper directory.

RECOMMENDATIONS

Based of the results from this study, I make the following three recommendations the BEMRP advisory committee:

1. Financially and institutionally support existing conservation education organizations.
2. Financially and institutionally support conservation education partnerships. These partnerships are a low-cost strategy that elevates the conservation education discussion from that of an organization to the vision of a watershed. These partnerships provide an opportunity to share information, resources, ideas, and allow the organizations to engage in partnership projects.
3. Financially and institutionally support the Montana Environmental Education Association's effort to create an online resource directory that would provide a continuously available information source.

This study has demonstrated that there is a high level of interorganizational communication among conservation education organizations in the Bitterroot Valley and that these organizations are have been and continue to willing to partner on projects with other organizations.

CONCLUSION

The completed conservation education assessment suggests that a great variety of programs are available to a wide variety of audiences and through a number of different mediums. This completed assessment provides valuable information for those organizations interested in filling gaps or avoiding duplication. Furthermore, the conservation education assessment was collected in such a way to support a database that is being used as a pilot region for an online Montana conservation education directory currently being assembled by the Montana Environmental Education Association.

Participant observation did reveal that while conservation education organizations are connected quite well throughout the Bitterroot and Missoula Watershed, that they struggle with limited funding that ultimately leads to high turnover. Additionally, the compacting factor of geographic distance means that these organizations have to be extremely resourceful to maintain their connectivity.

Bitterroot and Missoula conservation education organizations appear to have strong communication ties with each other. Bitterroot Environmental Education Partners, which compose a subset of the combined Bitterroot and Missoula conservation education organizations identified in this study, have extremely strong ties of communication among themselves. The length of ties are short, and the number of ties are many for all of the conservation education organizations in the study, which suggests that the conservation education community is connected well and that they could respond to new information quickly.

While social network analysis has been an effective tool at this small scale, which is concerned only with the conservation education organizations and not their audience members, expanding it to include all people who interact with all organizations would not only be a difficult and expensive, but perhaps an impossible exercise. However, in situations where the numbers of stakeholders form a discrete population (e.g. members of an organization or club), this tool can be used describe the existing communication structure and identify prominent stakeholders. Participant observation and interviews can be used in conjunction with social network analysis to explain the communication structure. Together, these tools offer a strong approach to study communication infrastructure.

The Bitterroot Environmental Education Partners serves as a model for other education partnerships like those forming in Missoula and Billings. More importantly, the Bitterroot Environmental Education Partners serves as a model collaborative partnership that can succeed despite the realities facing each of the partners competing individually for scarce resources. Although my original scale of interest was the Bitterroot Watershed, early successes have launched the Bitterroot Environmental Education Partners into a regional discussion. The Bitterroot Environmental Education Partners plans to use avenues like the Montana Environmental Education statewide meetings to simultaneously present their activities and results.

Research Accomplishments and Status: A literature review in the areas of improving interorganizational communication and political ecology was completed May 2001. Data collection was completed October 2001, data analysis immediately followed and was completed in December 2001.

Timeline of Accomplishments

- *December 2001-June 2001* Literature Review and Proposal
- *January 2001* - The Bitterroot Environmental Education Partners (BEEP) formed
- *March 2001* – Bitterroot Watershed Partnership Submitted Application to become 16th Large-Scale Watershed Restoration Project
- *June 2001* – Montana Community Foundation Awards the Bitterroot Environmental Education Partners \$500
- *July 2001* – Bitterroot Environmental Education Partners (BEEP) is awarded \$50,000 from the new Bitterroot Watershed Partnership
- *July 2001* – BEMRP Education Programs and Education Communication Assessment
- *August – December 2001* – the Bitterroot Environmental Education Partners uses assessment to create a 5 – year education plan (plans for programs, nature center, etc.) for the Bitterroot Watershed
- *September 2001* – Based on the success of the Bitterroot Environmental Education Partners, Missoula launches Missoula Environmental Education Partners.
- *October 2001* – the Bitterroot Environmental Education Partners applies for FY 02 Bitterroot Watershed Partnership Funds

Reporting & Technology Transfer Activities Associated with the Study in FY 01:

- List the refereed publications (please provide a copy of each if not already submitted this year): None
- List the non-refereed publications and final reports (please provide a copy of each if not already submitted this year): Submitted
- List the presentations given before scientific organizations (identify the invited presentations): Berkeley Ford Foundation Community Forestry Research Fellowship Meeting, October 2001, the Bitterroot Environmental Education Partners meeting January 2002.
- Provide the number of presentations to lay organizations: Grizzly Riders, September 2001
- Provide the number of tours given to educational and professional groups: None
- Provide the number of short courses/training sessions given to educational or professional groups: None
- Provide the number of videos and/or slide presentations made on research findings: BEMRP Bitterroot Meeting, November 2001

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ENDNOTES

¹ I was awarded a Ford Foundation Community Forestry Research Fellowship from Berkeley that emphasizes community forestry research and the participatory research approach.

² The 5-year education plan has turned into a loose working plan

³ Even more turnover/additions have occurred in 2002

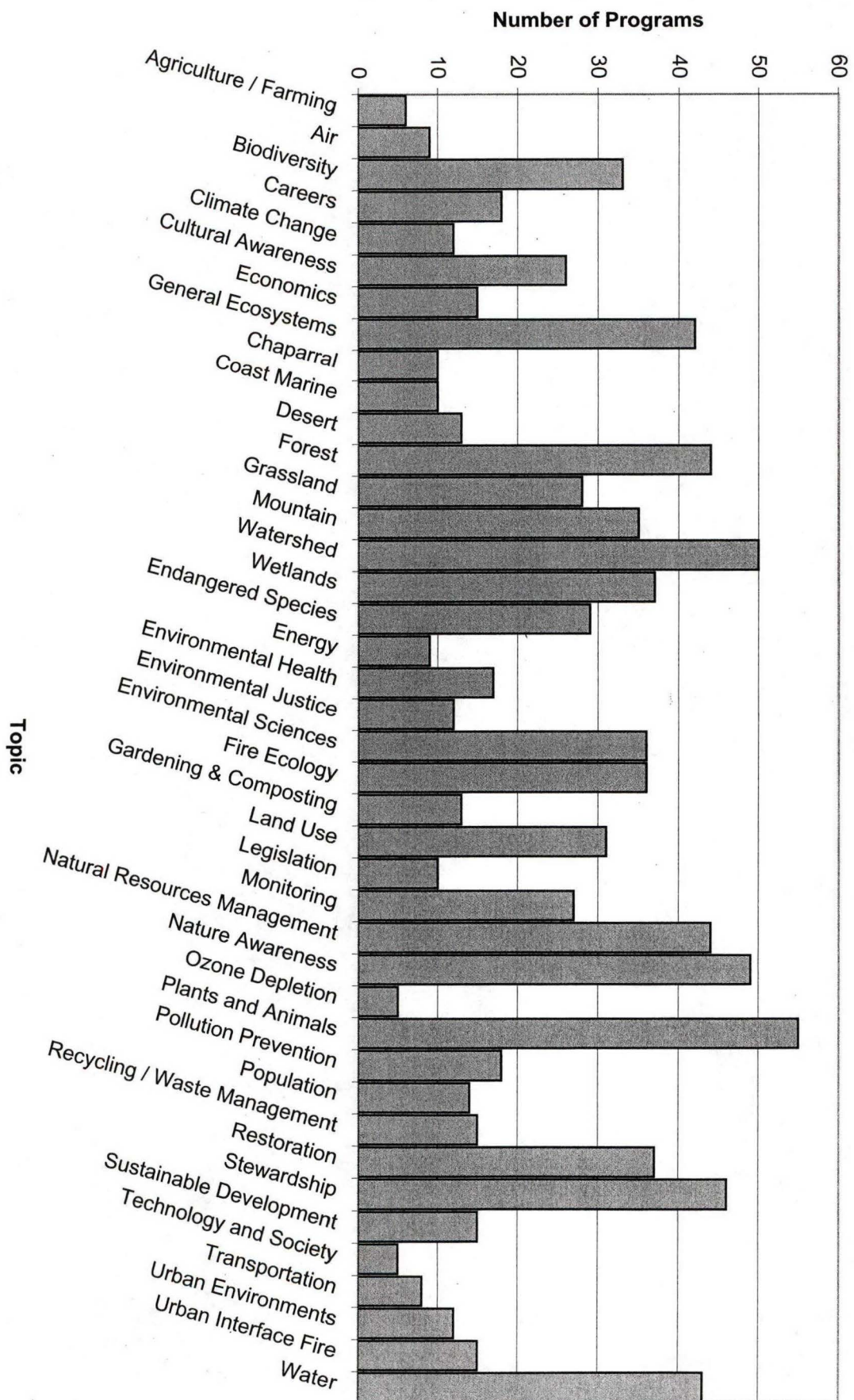


Figure 1. Number of Programs by Topic

Figure 2. Number of Programs By Audience

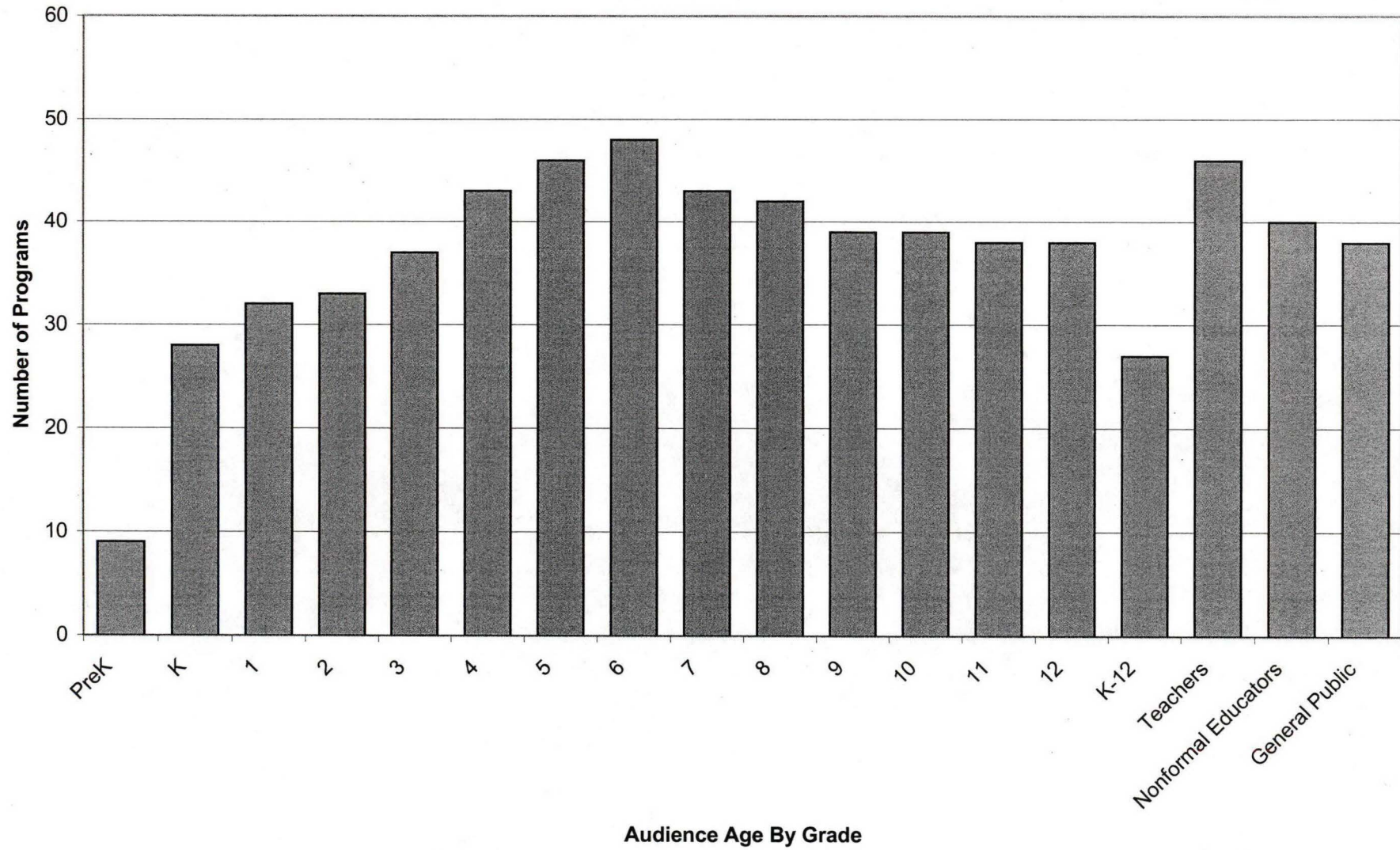


Figure 3. Number of Programs by Activity Type

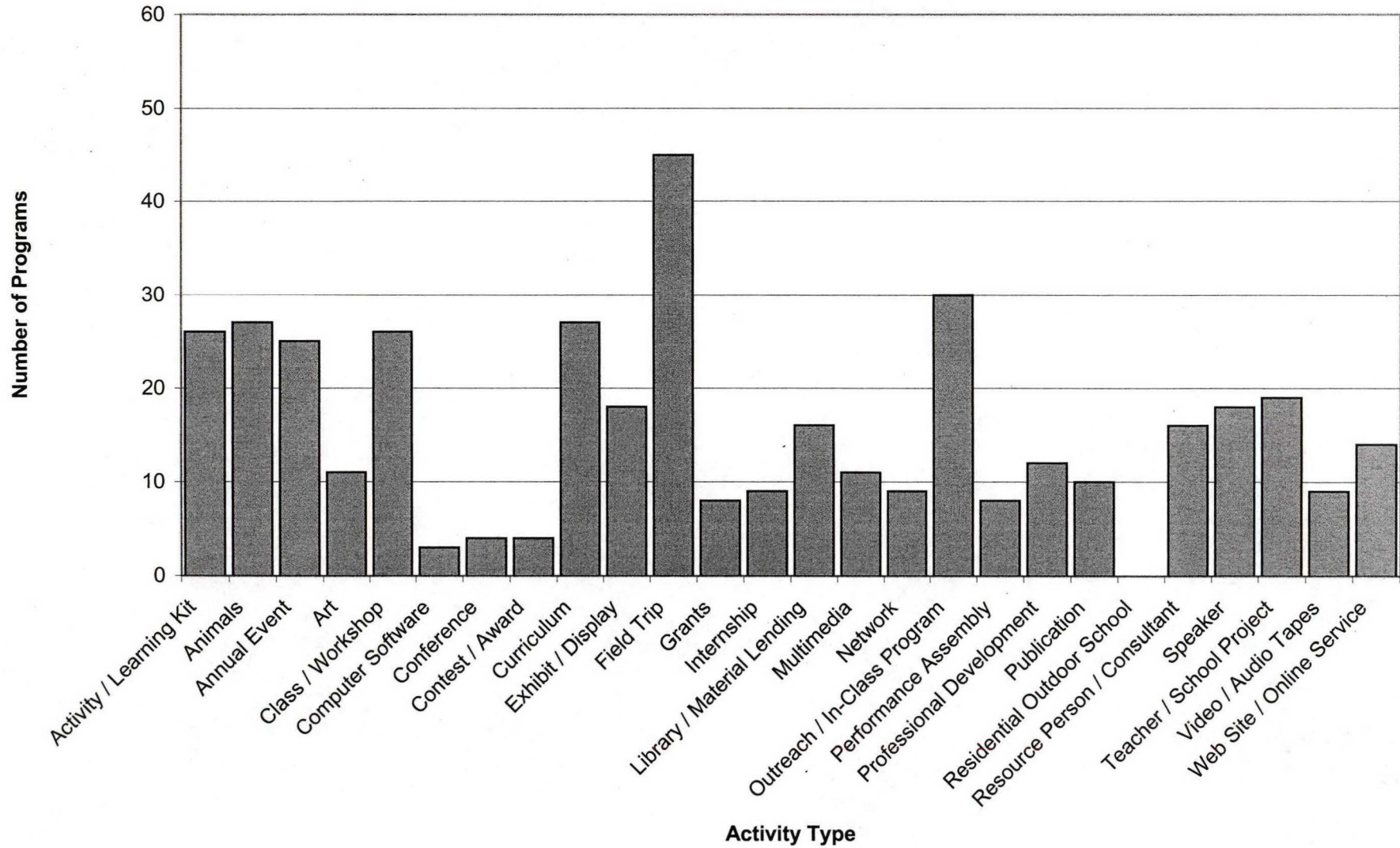


Figure 4. A Contour Map of Program Topics by Audience

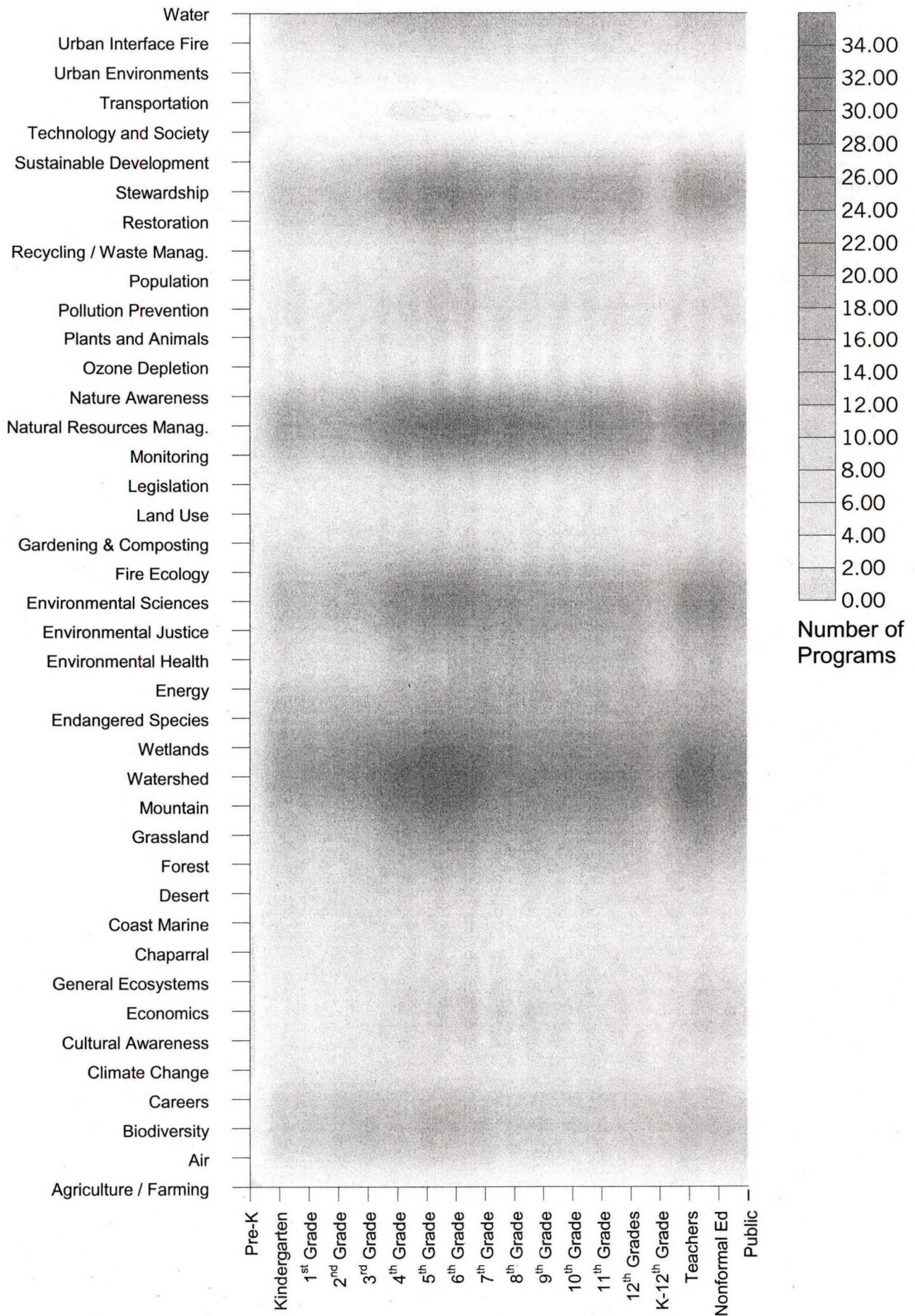


Figure 5. Random Social Network Arrangement of Bitterroot and Missoula Conservation Education Organizations

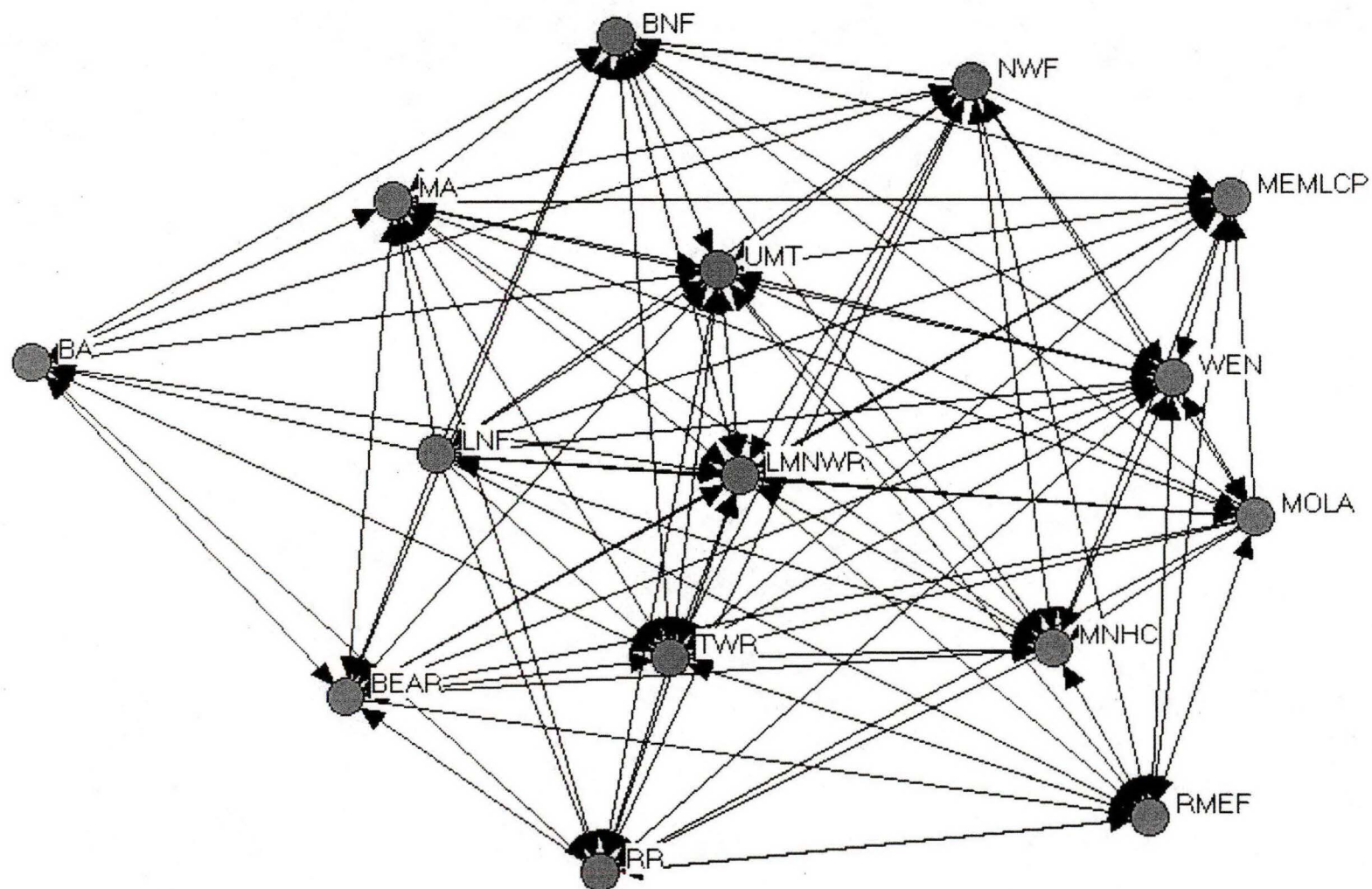


Figure 6. Random Social Network Arrangement of Bitterroot Conservation Education Organizations 2001

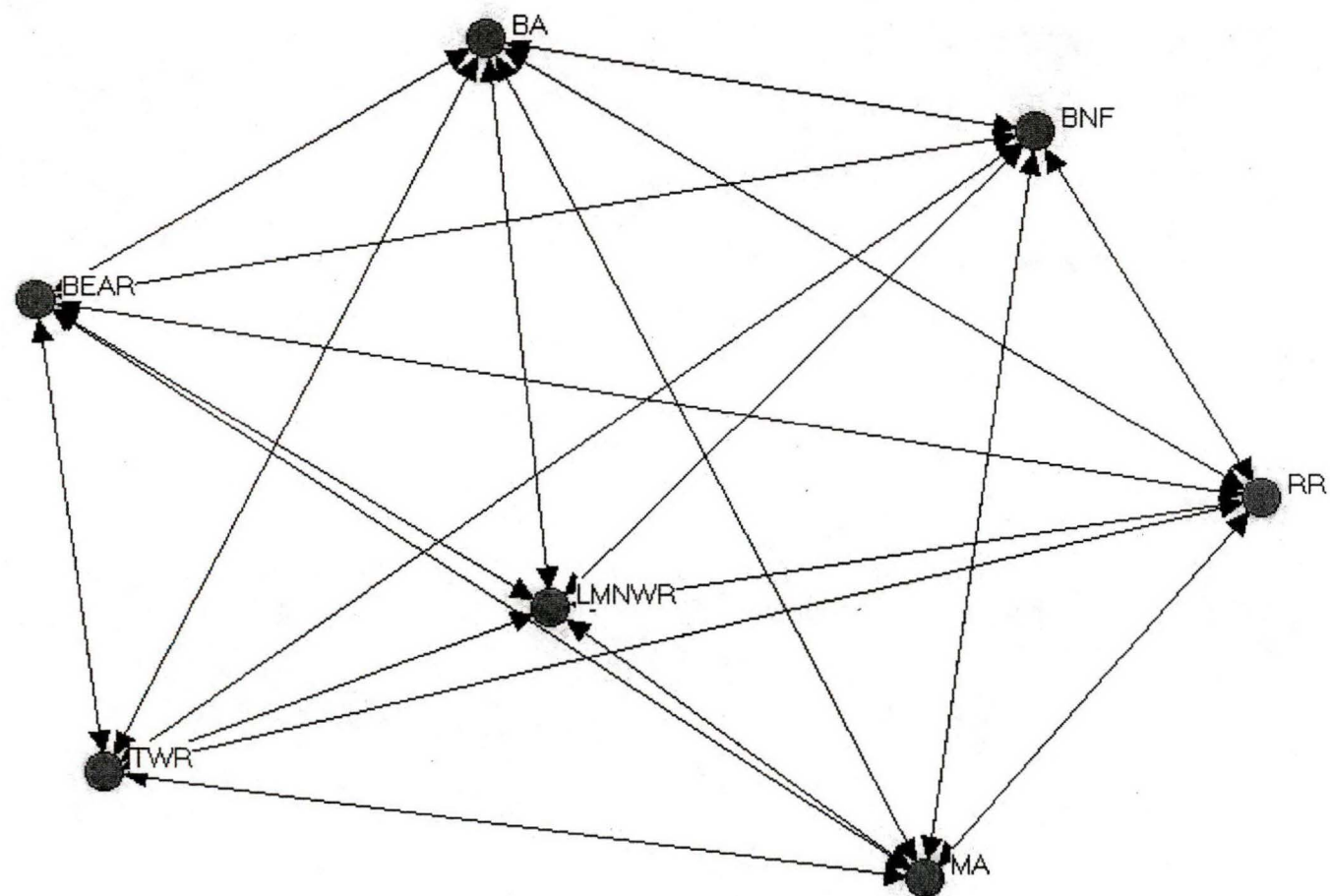


Table 1. Number of Programs by Conservation Education Topic and Audience

	PreK	K	1	2	3	4	5	6	7	8	9	10	11	12
Activity / Learning Kit	5	15	16	17	18	20	20	21	20	19	19	19	19	19
Animals	4	15	18	18	19	19	19	19	19	18	18	19	19	19
Annual Event	4	7	8	8	10	11	12	14	12	12	11	12	11	11
Art	3	10	10	10	10	10	10	10	10	10	10	10	10	10
Class / Workshop	4	12	12	13	13	14	14	16	15	14	13	13	13	13
Computer Software	1	1	1	1	1	2	2	2	2	2	2	2	2	2
Conference	1	2	2	2	2	2	2	2	3	3	3	3	3	3
Contest / Award	2	3	3	3	3	3	3	3	3	3	3	3	3	3
Curriculum	1	14	15	15	17	20	21	22	18	18	18	17	17	17
Exhibit / Display	6	13	13	13	14	14	14	15	13	13	13	13	13	13
Field Trip	7	19	22	23	25	27	29	31	28	27	24	25	24	24
Grants	1	4	4	4	4	4	4	5	5	5	5	5	5	5
Internship	1	5	5	5	5	6	6	7	7	7	6	6	6	6
Library / Material Lending	3	11	11	11	11	11	12	12	12	12	12	12	12	12
Multimedia	2	6	6	6	6	6	6	6	6	6	6	6	6	6
Network	1	7	7	7	7	7	7	7	8	8	8	8	8	8
Outreach / In-Class Program	4	14	14	14	15	17	18	19	19	18	17	16	16	16
Performance Assembly	2	4	4	4	4	4	4	4	5	5	5	5	5	5
Professional Development	1	6	6	6	6	7	7	8	8	8	8	8	8	8
Publication	2	5	5	5	6	8	8	8	7	7	7	7	7	7
Residential Outdoor School	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Resource Person / Consultant	2	10	10	10	11	12	13	14	14	13	13	13	13	13
Speaker	2	8	8	9	9	9	9	9	9	8	8	8	8	8
Teacher / School Project	3	12	13	13	13	13	13	15	13	13	12	13	13	13
Video / Audio Tapes	2	7	7	7	7	7	7	7	7	7	7	7	7	7
Web Site / Online Service	2	9	9	9	9	11	12	12	11	11	11	11	11	11

Table 1 continued. Number of Programs by Conservation Education Topic and Audience

	K-12	Teachers	Nonformal Educators	General Public
Activity / Learning Kit	15	20	19	13
Animals	15	18	18	17
Annual Event	6	13	12	11
Art	10	9	10	7
Class / Workshop	11	15	15	14
Computer Software	1	2	2	3
Conference	3	3	3	4
Contest / Award	3	3	3	3
Curriculum	14	22	18	11
Exhibit / Display	13	13	13	13
Field Trip	18	28	25	21
Grants	4	4	5	4
Internship	5	5	6	5
Literary / Material Lending	11	13	12	9
Multimedia	6	7	6	8
Network	7	6	7	6
Outreach / In-Class Program	14	20	18	15
Performance Assembly	5	6	6	7
Professional Development	6	9	8	5
Publication	5	7	7	7
Residential Outdoor School	0	0	0	0
Resource Person / Consultant	11	13	14	11
Speaker	8	8	8	10
Teacher / School Project	11	15	15	10
Video / Audio Tapes	7	6	7	5
Web Site / Online Service	9	12	11	10

Table 2. Number of Programs by Conservation Education Focus and Audience

	PreK	K	1	2	3	4	5	6	7	8	9	10	11	12	K-12	Teachers	Nonformal Educators	General Public	
Agriculture / Farming	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	2	5
Air	1	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	4
Biodiversity	4	17	18	19	20	19	20	21	19	17	17	17	17	17	17	17	21	19	17
Careers	2	8	8	8	8	13	13	14	15	15	15	14	14	14	8	14	14	10	
Climate Change	1	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	6
Cultural Awareness	2	9	9	9	10	13	14	17	16	16	16	15	15	15	9	17	15	13	
Economics	1	5	5	5	5	9	9	11	10	10	10	9	9	9	5	11	11	10	
General Ecosystems	2	17	18	18	19	26	28	30	27	28	26	26	26	26	17	28	26	21	
Chaparral	1	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	
Coast Marine	1	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	5	
Desert	2	8	8	8	9	9	9	9	8	8	8	8	8	8	8	8	9	7	7
Forest	3	19	20	20	23	29	31	32	28	27	26	25	25	25	18	32	28	25	
Grassland	3	12	12	12	13	19	19	21	19	19	18	17	17	17	12	21	18	16	
Mountain	2	13	14	14	17	24	25	27	23	22	21	20	20	20	13	26	23	20	
Watershed	5	20	23	24	27	31	34	36	30	28	27	27	27	27	21	35	28	26	
Wetlands	4	18	21	21	25	25	27	27	25	23	22	23	22	22	19	27	23	19	
Endangered Species	5	16	16	17	17	18	20	21	21	20	19	19	18	18	17	19	18	17	
Energy	1	6	6	6	6	6	6	7	6	6	6	6	6	6	6	7	7	6	
Environmental Health	2	7	7	7	7	12	12	13	15	15	15	14	14	14	8	13	13	10	
Environmental Justice	1	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
Environmental Sciences	2	14	14	15	16	22	23	25	22	21	20	19	19	19	14	24	23	17	
Fire Ecology	2	12	12	13	15	20	21	23	22	21	19	18	18	18	11	23	19	21	
Gardening & Composting	1	6	6	7	7	7	7	7	7	6	6	6	6	6	6	6	6	6	
Land Use	4	12	12	12	12	19	20	22	21	22	20	19	19	19	12	20	20	18	
Legislation	3	4	4	4	4	5	5	6	6	6	6	6	6	6	4	7	6	8	
Monitoring	3	12	12	12	13	17	18	19	18	18	18	17	17	17	12	20	18	17	
Natural Resources Manag.	5	20	20	20	21	28	29	32	30	31	29	28	27	27	20	28	28	24	
Nature Awareness	7	18	20	21	23	24	26	27	26	26	24	25	24	24	19	28	23	25	
Ozone Depletion	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	3	4	
Plants and Animals	8	25	28	29	33	34	37	36	32	31	28	29	29	29	24	35	31	29	
Pollution Prevention	1	7	7	7	8	9	11	12	10	10	9	9	9	9	7	10	10	9	
Population	2	6	6	6	7	8	8	9	8	8	7	7	7	7	6	8	8	7	
Recycling / Waste Manag.	1	7	7	7	7	8	10	11	10	9	8	8	8	8	7	8	8	6	
Restoration	4	17	17	18	19	23	24	25	23	22	21	20	20	20	18	25	22	19	
Stewardship	5	17	17	18	19	26	28	31	28	28	26	25	25	25	17	29	26	22	
Sustainable Development	1	7	7	7	7	8	8	9	8	8	8	8	8	8	7	9	9	9	
Technology and Society	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	3	4	
Transportation	1	5	5	5	5	5	5	6	5	5	5	5	5	5	5	6	6	5	
Urban Environments	1	6	6	6	6	6	6	7	8	8	8	8	8	8	7	8	8	7	
Urban Interface Fire	2	7	7	7	7	12	12	13	13	13	13	12	12	12	7	13	12	10	
Water	4	18	21	22	24	26	29	29	27	25	24	25	24	24	19	28	24	22	

Table 3. Number of Programs by Conservation Education Topic and Activity Type

	Activity / Learning Kit	Animals	Annual Event	Art	Class / Workshop	Computer Software	Conference	Contest / Award	Curriculum	Exhibit / Display	Field Trip	Grants	Internship	Library / Material Lending	Multimedia	Network
Agriculture / Farming	3	1	1	1	2	0	0	0	3	2	2	0	1	4	5	1
Air	6	5	1	5	5	0	0	0	6	4	5	4	4	6	4	4
Biodiversity	16	14	9	7	13	2	2	2	14	10	18	7	7	12	9	7
Careers	10	6	6	4	8	2	1	1	12	5	10	4	5	7	5	6
Climate Change	9	7	2	7	7	1	2	1	9	5	7	5	5	9	7	6
Cultural Awareness	13	10	6	7	11	1	2	1	15	7	13	7	7	12	8	7
Economics	8	5	5	4	6	2	1	1	10	5	9	4	5	7	5	4
General Ecosystems	17	15	12	7	12	2	2	1	20	9	21	7	8	13	8	8
Chaparral	7	6	2	6	6	1	1	1	7	5	6	5	5	7	5	5
Coast Marine	7	6	2	6	6	1	1	1	7	5	6	5	5	7	5	5
Desert	8	6	3	6	7	1	1	1	9	7	7	5	5	8	5	5
Forest	17	16	12	7	15	2	2	1	21	10	24	6	7	12	9	7
Grassland	13	8	7	6	12	2	1	1	14	9	16	6	7	8	6	5
Mountain	15	13	9	7	11	2	2	1	21	10	19	6	7	12	8	6
Watershed	22	16	13	7	17	2	2	1	20	14	29	5	6	13	9	7
Wetlands	16	17	12	9	13	1	2	2	16	12	23	5	6	12	7	7
Endangered Species	17	14	9	9	14	2	4	3	14	11	16	7	8	14	8	8
Energy	6	6	2	5	5	0	1	0	7	4	6	4	5	7	5	5
Environmental Health	11	8	4	6	7	2	3	1	11	5	10	5	6	8	6	7
Environmental Justice	8	7	2	7	8	1	2	1	8	5	7	5	5	8	6	6
Environmental Sciences	18	9	9	5	15	1	1	0	18	9	19	4	6	12	7	6
Fire Ecology	14	10	11	3	11	2	1	2	16	7	20	3	5	8	9	4
Gardening & Composting	8	5	2	5	9	0	0	0	6	5	9	4	4	6	5	4
Land Use	16	11	10	8	14	3	3	3	17	9	18	7	9	13	9	9
Legislation	6	2	3	2	5	2	2	2	5	4	6	2	2	4	5	2
Monitoring	12	11	6	5	10	2	2	2	16	8	14	5	5	9	6	6
Natural Resources Manag.	20	17	13	9	14	3	3	2	20	13	24	7	8	13	9	8
Nature Awareness	16	21	18	7	17	2	4	3	16	9	29	5	6	12	9	6
Ozone Depletion	3	2	1	2	2	0	1	0	3	1	2	0	1	4	5	2
Plants and Animals	22	26	15	10	18	2	4	3	20	14	34	8	9	15	11	9
Pollution Prevention	10	9	7	7	8	1	2	1	11	7	12	7	8	9	6	7
Population	9	8	5	6	6	1	2	2	9	5	8	5	6	7	6	5
Recycling / Waste Manag.	9	8	5	6	7	0	1	0	9	4	11	6	7	7	5	6
Restoration	19	13	8	9	15	2	4	2	20	10	20	7	8	13	11	8
Stewardship	23	13	13	9	20	3	3	2	23	12	27	8	9	14	10	9
Sustainable Development	8	8	4	7	8	1	2	1	9	6	9	6	6	9	7	6
Technology and Society	3	2	1	2	2	0	1	0	3	1	2	0	1	4	5	2
Transportation	5	5	2	4	4	0	0	0	6	4	5	4	5	6	4	4
Urban Environments	7	7	3	4	5	0	1	0	8	4	6	5	6	7	5	6
Urban Interface Fire	7	3	3	1	4	1	0	0	8	3	7	0	1	4	5	1
Water	21	16	11	7	13	2	2	1	17	10	26	6	7	12	7	8

Table 3 continued. Number of Programs by Conservation Education Topic and Activity Type

	Outreach / In-Class Program	Performance Assembly Professional Development		Publication	Residential Outdoor School	Resource Person / Consultant	Speaker Teacher / School Project		Video / Audio Tapes	Web Site / Online Service
Agriculture / Farming	4	1	1	1	0	1	2	1	1	0
Air	7	1	4	4	0	5	5	5	4	4
Biodiversity	17	4	8	6	0	9	10	10	9	8
Careers	11	2	6	5	0	7	4	6	5	7
Climate Change	10	3	5	5	0	7	6	7	6	5
Cultural Awareness	17	3	9	5	0	8	8	9	6	6
Economics	9	2	5	5	0	6	4	6	4	6
General Ecosystems	19	4	9	8	0	11	7	13	8	9
Chaparral	8	2	5	5	0	6	6	6	5	5
Coast Marine	8	2	5	5	0	6	6	6	5	5
Desert	8	2	6	6	0	6	6	6	5	5
Forest	19	4	9	8	0	12	8	12	8	12
Grassland	13	3	8	8	0	8	7	9	5	10
Mountain	17	3	9	8	0	11	7	12	7	10
Watershed	22	5	7	7	0	10	11	15	8	12
Wetlands	16	4	6	6	0	10	7	9	7	6
Endangered Species	19	6	8	7	0	13	11	10	8	8
Energy	8	2	4	4	0	6	4	5	4	3
Environmental Health	12	4	6	6	0	8	6	7	5	6
Environmental Justice	9	3	5	5	0	7	7	7	5	5
Environmental Sciences	19	3	8	5	0	10	8	10	7	8
Fire Ecology	18	2	6	3	0	8	7	9	5	8
Gardening & Composting	9	2	4	4	0	6	9	5	4	4
Land Use	18	5	9	9	0	11	9	10	9	10
Legislation	6	2	2	3	0	3	3	4	3	3
Monitoring	16	2	7	6	0	9	7	11	8	10
Natural Resources Manag.	21	5	9	8	0	12	8	13	9	10
Nature Awareness	19	8	8	5	0	11	13	11	5	6
Ozone Depletion	4	2	0	1	0	2	1	2	1	0
Plants and Animals	26	7	9	8	0	14	14	14	9	10
Pollution Prevention	12	4	7	5	0	8	7	7	5	5
Population	11	4	5	4	0	7	5	6	3	4
Recycling / Waste Manag.	11	2	6	4	0	8	6	6	4	4
Restoration	22	6	9	6	0	12	12	13	9	12
Stewardship	24	5	12	8	0	12	12	15	9	12
Sustainable Development	11	4	6	5	0	8	7	7	6	6
Technology and Society	4	2	0	1	0	2	1	2	1	0
Transportation	7	1	4	4	0	5	4	4	4	3
Urban Environments	11	2	5	4	0	6	5	4	6	4
Urban Interface Fire	8	1	1	2	0	4	1	3	2	3
Water	19	4	8	6	0	9	9	12	7	10

Table 4. Social Network Analysis Asymmetric Matrix for Bitterroot and Missoula Conservation Education Organizations (15 x 15 binary)

source recipient	BA	BEAR	BNF	MEMLC	LMNWR	MOLA	MA	MNHC	NWF	RR	RMEF	TWR	UMT	LNF	WEN
BA	1	1	1	0	1	0	1	0	1	1	0	1	1	0	0
BEAR	1	1	1	1	1	0	1	1	0	0	1	1	1	0	1
BNF	1	1	1	1	1	0	1	1	0	0	0	1	1	0	1
MEMLC	0	1	1	1	1	0	1	1	0	0	1	1	1	1	1
LMNWR	1	1	1	0	1	0	1	1	0	1	1	1	1	1	1
MOLA	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
MA	1	1	1	0	1	0	1	0	0	1	0	1	1	0	0
MNHC	0	0	1	0	1	0	1	1	1	1	1	1	1	1	1
NWF	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1
RR	1	1	1	0	1	0	1	0	0	1	1	0	1	0	0
RMEF	0	0	0	1	0	1	0	1	0	1	1	1	1	0	1
TWR	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
UMT	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
LNF	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
WEN	0	1	0	1	1	1	1	1	1	1	1	1	1	0	1

Table 5. Social Network Analysis Asymmetric Matrix for Bitterroot Environmental Education Partners (7 x 7 valued / rankings) Fall 2002

source recipient	BA	BEAR	BNF	LMNWR	MA	RR	TWR
BA	1	6	5	2	4	7	3
BEAR	5	1	4	3	6	7	2
BNF	3	5	1	2	6	7	4
LMNWR	4	6	5	1	2	7	3
MA	2	6	7	3	1	4	5
RR	3	7	6	5	2	1	4
TWR	5	4	6	3	2	7	1

Table 6. Matrix Univariate Statistics Summary of Bitterroot and Missoula Conservation Education Organizations

Measure	Value
Mean	0.756
Std Dev	0.43
Sum	170
Variance	0.185
Minimum	0
Maximum	1
N of Obs	225

Table 7. Row-wise Univariate Statistics Summary of Bitterroot and Missoula Conservation Education Organizations

Variable	Mean	Std Dev	Sum	Variance	Minimum	Maximum	N of Obs
BA	0.6	0.49	9	0.24	0	1	15
BEAR	0.733	0.442	11	0.196	0	1	15
BNF	0.667	0.471	10	0.222	0	1	15
MEMLCP	0.733	0.442	11	0.196	0	1	15
LMNWR	0.8	0.4	12	0.16	0	1	15
MOLA	0.933	0.249	14	0.062	0	1	15
MA	0.533	0.499	8	0.249	0	1	15
MNHC	0.733	0.442	11	0.196	0	1	15
NWF	0.933	0.249	14	0.062	0	1	15
RR	0.467	0.499	7	0.249	0	1	15
RMEF	0.533	0.499	8	0.249	0	1	15
TWR	0.867	0.34	13	0.116	0	1	15
UMT	1	0	15	0	1	1	15
LNF	1	0	15	0	1	1	15
WEN	0.8	0.4	12	0.16	0	1	15

Table 8. Column-wise Univariate Statistics Summary of Bitterroot and Missoula Conservation Education Organizations

Variable	Mean	Std Dev	Sum	Variance	Minimum	Maximum	N of Obs
BA	0.667	0.471	10	0.222	0	1	15
BEAR	0.8	0.4	12	0.16	0	1	15
BNF	0.8	0.4	12	0.16	0	1	15
MEMLCP	0.667	0.471	10	0.222	0	1	15
LMNWR	0.933	0.249	14	0.062	0	1	15
MOLA	0.4	0.49	6	0.24	0	1	15
MA	0.933	0.249	14	0.062	0	1	15
MNHC	0.8	0.4	12	0.16	0	1	15
NWF	0.533	0.499	8	0.249	0	1	15
RR	0.8	0.4	12	0.16	0	1	15
REMF	0.8	0.4	12	0.16	0	1	15
TWR	0.933	0.249	14	0.062	0	1	15
UMT	1	0	15	0	1	1	15
LNF	0.467	0.499	7	0.249	0	1	15
WEN	0.8	0.4	12	0.16	0	1	15

**Table 9. Geodesic Distances for Bitterroot and Missoula Conservation Education Organizations (15
x 15 binary)**

	BA	BEAR	BNF	MEMLC	LMNWR	MOLA	MA	MNHC	NWF	RR	RMEF	TWR	UMT	LNF	WEN
BA	0	1	1	2	1	2	1	2	1	1	2	1	1	2	2
BEAR	1	0	1	1	1	2	1	1	2	2	1	1	1	2	1
BNF	1	1	0	1	1	2	1	1	2	2	2	1	1	2	1
MEMLC	2	1	1	0	1	2	1	1	2	2	1	1	1	1	1
LMNWR	1	1	1	2	0	2	1	1	2	1	1	1	1	1	1
MOLA	2	1	1	1	1	0	1	1	1	1	1	1	1	1	1
MA	1	1	1	2	1	2	0	2	2	1	2	1	1	2	2
MNHC	2	2	1	2	1	2	1	0	1	1	1	1	1	1	1
NWF	1	2	1	1	1	1	1	1	0	1	1	1	1	1	1
RR	1	1	2	2	1	2	1	2	2	0	1	2	1	2	2
RMEF	2	2	2	1	2	1	2	1	2	1	0	1	1	2	1
TWR	1	1	1	1	1	2	1	1	1	1	1	0	1	2	1
UMT	1	1	1	1	1	1	1	1	1	1	1	1	0	1	1
LNF	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1
WEN	2	1	2	1	1	1	1	1	1	1	1	1	1	2	0

Table 10. Geodesic Distances for Bitterroot and Missoula Conservation Education Organizations (15 x 15 binary)

	BA	BEAR	BNF	MEMLC	LMNWR	MOLA	MA	MNHC	NWF	RR	RMEF	TWR	UMT	LNF	WEN
BA	-	-	-	2	-	2	-	2	-	-	2	-	-	2	2
BEAR	-	-	-	-	-	2	-	-	2	2	-	-	-	2	-
BNF	-	-	-	-	-	2	-	-	2	2	2	-	-	2	-
MEMLC	2	-	-	-	-	2	-	-	2	2	-	-	-	-	-
LMNWR	-	-	-	2	-	2	-	-	2	-	-	-	-	-	-
MOLA	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MA	-	-	-	2	-	2	-	2	2	-	2	-	-	2	2
MNHC	2	2	-	2	-	2	-	-	-	-	-	-	-	-	-
NWF	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
RR	-	-	2	2	-	2	-	2	2	-	-	2	-	2	2
RMEF	2	2	2	-	2	-	2	-	2	-	-	-	-	2	-
TWR	-	-	-	-	-	2	-	-	-	-	-	-	-	2	-
UMT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LNF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WEN	2	-	2	-	-	-	-	-	-	-	-	-	-	2	-

Table 11. Geodesic Paths for Bitterroot and Missoula Conservation Education Organizations (15 x 15 binary)

	BA	BEAR	BNF	MEMLC	LMNWR	MOLA	MA	MNHC	NWF	RR	RMEF	TWR	UMT	LNF	WEN
BA	-	-	-	5	-	2	-	6	-	-	6	-	-	3	6
BEAR	-	-	-	-	-	3	-	-	5	8	-	-	-	4	-
BNF	-	-	-	-	-	2	-	-	5	7	7	-	-	4	-
MEMLC	7	-	-	-	-	4	-	-	5	8	-	-	-	-	-
LMNWR	-	-	-	7	-	4	-	-	6	-	-	-	-	-	-
MOLA	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MA	-	-	-	4	-	-	-	5	3	-	5	-	-	2	5
MNHC	8	8	-	7	-	5	-	-	-	-	-	-	-	-	-
NWF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RR	-	-	5	3	-	2	-	4	2	-	-	6	-	2	4
RMEF	3	6	5	-	7	-	7	-	5	-	-	-	-	4	-
TWR	-	-	-	-	-	4	-	-	-	-	-	-	-	5	-
UMT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LNF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
WEN	7	-	9	-	-	-	-	-	-	-	-	-	-	6	-

Table 12. Maximum Flows for Bitterroot and Missoula Conservation Education Organizations (15 x 15 binary)

	BA	BEAR	BNF	MEMLC	LMNWR	MOLA	MA	MNHC	NWF	RR	RMEF	TWR	UMT	LNF	WEN
BA	0	8	8	8	8	5	8	8	7	8	8	8	8	6	8
BEAR	9	0	10	9	10	5	10	10	7	10	10	10	10	6	10
BNF	9	9	0	9	9	5	9	9	7	9	9	9	9	6	9
MEMLC	9	10	10	0	10	5	10	10	7	10	10	10	10	6	10
LMNWR	9	11	11	9	0	5	11	11	7	11	11	11	11	6	11
MOLA	9	11	11	9	13	0	13	11	7	11	11	13	13	6	11
MA	7	7	7	7	7	5	0	7	7	7	7	7	7	6	7
MNHC	9	10	10	9	10	5	10	0	7	10	10	10	10	6	10
NWF	9	11	11	9	13	5	13	11	0	11	11	13	13	6	11
RR	6	6	6	6	6	5	6	6	6	0	6	6	6	6	6
RMEF	7	7	7	7	7	5	7	7	7	7	0	7	7	6	7
TWR	9	11	11	9	12	5	12	11	7	11	11	0	12	6	11
UMT	9	11	11	9	13	5	13	11	7	11	11	13	0	6	11
LNF	9	11	11	9	13	5	13	11	7	11	11	13	14	0	11
WEN	9	11	11	9	11	5	11	11	7	11	11	11	11	6	0

Table 13. Social Network Analysis Matrix for Bitterroot Environmental Education Partners (7 x 7 valued / rankings)

source recipient	BA	BEAR	BNF	LMNWR	MA	RR	TWR
BA	1	7	5	4	3	6	2
BEAR	6	1	2	4	7	5	3
BNF	2	7	1	3	4	6	5
LMNWR	3	7	5	1	2	6	4
MA	3	7	4	2	1	6	5
RR	2	7	6	4	3	1	5
TWR	5	7	4	3	2	6	1

Table 14. Social Network Analysis Summary of the Change in Communication for Bitterroot Environmental Education Partners (7 x 7 valued / rankings) Fall 2003 - Fall 2002

source recipient	BA	BEAR	BNF	LMNWR	MA	RR	TWR
BA	-	1	0	2	-1	-1	-1
BEAR	1	-	-2	1	1	-2	1
BNF	-1	2	-	1	-2	-1	1
LMNWR	-1	1	0	-	0	-1	1
MA	1	1	-3	-1	-	2	0
RR	-1	0	0	-1	1	-	1
TWR	0	3	-2	0	0	-1	-

Appendix I. Abbreviations for Conservation Education Organizations and Partnerships

BA	Bitterroot Audubon
BEAR	Bitterroot Ecological Awareness Resources
BEEP	Bitterroot Environmental Education Partners
BEMRP	Bitterroot Ecosystem Management Research Project
BNF	Bitterroot National Forest
BWP	Bitterroot Watershed Partnership
LMNWR	Lee Metcalf National Wildlife Refuge
LNF	Lolo National Forest
MEEA	Montana Environmental Education Association
MOLA	Missoula Outdoor Learning Adventures
MA	Montana Audubon
MNHC	The Montana Natural History Center
NWF	National Wildlife Federation
RR	Raptors of the Rockies
RMEF	Rocky Mountain Elk Foundation
TWR	Teller Wildlife Refuge
WEN	Watershed Education Network
UMT	University of Montana – Education Department

Bitter Root Environmental Education Partners

Online Resource Directory

Part 1-Environmental Education Provider Profile

Contact Information:

EE Provider Name _____

Contact Name (First & Last) _____

Type of provider (**check one**):

- ☐ For profit
- ☐ Not for profit
- ☐ College/University
- ☐ School (PreK-12)
- ☐ Government (**check all that apply**):
 - ☐ Federal
 - ☐ State
 - ☐ Regional
 - ☐ County
 - ☐ City

Street Address _____

Mailing Address (if different) _____

City _____

State _____ Zip Code _____

Phone (include area code) _____

Fax (include area code) _____

EE Provider E-mail address _____

EE Provider Web site _____

EE Provider Mission Statement/Purpose:

Montana Counties Served (check "Montana" or all counties that apply):

- ☐ Ravalli
- ☐ Missoula
- ☐ Other County(s) _____

Please Return This Form To: **Stephanie Lynn Gripne**
Boone and Crockett Wildlife
Conservation Program
University of Montana
Missoula MT 59812
406-243-4128
sgripne@selway.umt.edu

Bitter Root Environmental Education Partners

Online Resource Directory

Part 2-Associated Program/Resource Profile

Note: this form is for specific programs/resources associated with an EE provider or school listed in the directory. Information should reflect an individual program or resource, NOT the provider's full services. Include one program/resource per form; make copies as needed.

Program/Resource Title _____

Description _____

Contact Information:

Note: If contact information is identical to that on Part 1, you may leave these fields blank. The information from Part 1 will be automatically entered in the program record.

EE Provider (required) _____

Program/Resource Contact Name _____

Phone (with area code) _____ **Fax (with area code)** _____

Program/Resource E-mail _____

Program/Resource Web site _____

Street Address _____

Mailing Address (if different) _____

☐ **City** _____ **State** _____ **Zip** _____

Montana Counties Served (check "Montana" or all counties that apply):

☐ Ravalli

☐ Missoula

☐ Other County(s) _____

Program/Resource Type (check all that apply):

☐ Activity/Learning Kit

☐ Animals

☐ Annual Event

☐ Art

☐ Class/Workshop

☐ Computer Software

☐ Conference

☐ Contest/Award

☐ Curriculum

☐ Exhibit/Display

☐ Field Trip

☐ Grants

☐ Internship

☐ Library/Material Lending

☐ Multimedia

☐ Network

☐ Outreach/In-Class Program

☐ Performance/ Assembly

☐ Professional Development

☐ Publication

☐ Residential Outdoor School

☐ Resource Person/ Consultant

☐ Speaker

☐ Teacher/School Project

☐ Video/Audio Tapes

☐ Web Site/Online Service

Grades/Audience Served (*check all that apply*):

☐ PreK

☐ K

☐ 1

☐ 2

☐ 3

☐ 4

☐ 5

☐ 6

☐ 7

☐ 8

☐ 9

☐ 10

☐ 11

☐ 12

☐ K-12

☐ Teachers (pre-service or in-service)

☐ Nonformal educators

☐ General public

Academic Focus (*check all that apply*):

☐ Health

☐ History/Social Sciences

☐ Language Arts

☐ Mathematics

☐ Physical Education

☐ Science

☐ Visual/Performing Arts

☐ Interdisciplinary

Environmental Education Focus (*check all that apply*):

☐ Agriculture/Farming

☐ Air

☐ Biodiversity

☐ Careers

☐ Climate Change

☐ Cultural Awareness

☐ Economics

Ecosystems

☐ General

☐ Chaparral

☐ Coast/Marine

☐ Desert

☐ Forest

☐ Grassland

☐ Mountain

☐ Watershed

☐ Wetlands

Endangered Species

☐ Energy

☐ Environmental Health

☐ Environmental Justice

☐ Environmental Sciences

☐ Fire Ecology

☐ Gardening & Composting

☐ Land Use

☐ Legislation

☐ Monitoring

☐ Natural Resources/ Resource Management

☐ Nature Awareness

☐ Ozone Depletion

☐ Plants and Animals

☐ Pollution Prevention

☐ Population

☐ Recycling/Waste Management

☐ Restoration

☐ Stewardship

☐ Sustainable Development

☐ Technology and Society

☐ Transportation

☐ Urban Environments

☐ Urban Interface Fire

☐ Water

Program/Resource Availability:

Dates Available (indicate start and end dates) _____

Days & Hours _____

Availability Restrictions _____

Size of Group Accommodated _____ Student:Instructor Ratio _____

Cost _____

Reservations/Ordering Information _____

Bilingual availability _____

Languages Spoken _____

Disabled access _____

Amenities available (restrooms, bookstore, etc.) _____

Public Transit _____

Return this form to: **Stephanie Lynn Gripne**
 Boone and Crockett Wildlife
 Conservation Program
 University of Montana
 Missoula MT 59812
 406-243-4128
 sgripne@selway.umt.edu

Appendix III. Social Network Analysis Survey

		Does your organization work with the following providers (1 = yes, 0 = no)	Which organizations does your organization communicate with the most? (1 = highest (yourself), 15 = lowest, a value can only be used once)
	Bitterroot and Missoula Watershed Environmental Education Providers		
1	Bitterroot Audubon		
2	Bitterroot Ecological Awareness Resources		
3	Bitterroot National Forest		
4	University of Montana -Learning Center		
5	Lee Metcalf National Wildlife Refuge		
6	Missoula Outdoor Learning Adventures		
7	Montana Audubon		
8	Montana Natural History Center		
9	National Wildlife Federation		
10	Raptor of the Rockies		
11	Rocky Mountain Elk Foundation		
12	Teller Wildlife Refuge		
13	University of Montana		
14	Watchable Wildlife - Lolo National Forest		
15	Watershed Education Network		

APPENDIX IV. THE HISTORY OF BEEP

In February 8th, 2000, a new actor in the Bitterroot conservation education community called a meeting to introduce themselves to the community, learn about what the different organizations emphasized, and actively begin laying down the groundwork of an education partnership similar to one they had been involved in during a previous job. What would become the Bitterroot Environmental Education Partners met again February 22 and March 13th. The primary purpose of these initial meetings was to share calendars of upcoming events, discuss planned partnership activities like teacher's workshops, and discuss the long-term purpose of having an education partnership. The group began to splinter because almost all of the organizations have extremely busy spring schedules, personalities, and varied opinions regarding how time should be spent at the meetings. Some members wanted to spend time developing a mission, while others did not want to spend their time, at least at that point in time, working towards this goal.

Spring 2000 came and went, and the future of BEEP was uncertain. The original actor that spearhead the group was not permanently hired and soon left the Bitterroot Watershed for other employment. At the same time, a separate, but related initiative that has become known as the Bitterroot Watershed Partnership (BWP) was starting to form as one of the Large-Scale Watershed Restoration Projects sponsored by the U.S. Forest Service. My involvement as an economist was requested by some of the early leaders of this new partnership. Several of us encouraged the involvement of the BEEP members to this larger partnership because education and communication are one of the four main objectives. Please see <http://www.bitterroot.net/wforum/Bitterroot%20Watershed%20Partnership.htm> for more information about the Bitterroot Watershed Partnership. Acceptance into the Large-Scale Watershed Restoration Project allowed the Bitterroot Watershed Partnership to compete for up to

\$3 million dollars a year for 5 years. While individual education partners received over \$40,000 The Bitterroot Partnership received initial funding of \$130,000 of which \$5,400 was to be allocated specifically to BEEP. Since all of the education projects submitted could not be supported by the \$5,400, an emergency BEEP meeting was called to write a proposal for the grant money. This proposal for a small amount of money was the turning point for BEEP. They met at a river access and hammered out the proposal, determined who would be responsible for supervising the community education workshops sponsored by the partners, and discussed the idea for a 5-year watershed education plan for the Bitterroot Watershed.

The most recent Bitterroot Watershed Partnership proposal included over \$100,000 of BEEP - sponsored projects as well as several other individual education projects. BEEP is in the process of combining a position with Audubon to hire a part-time coordinator to run BEEP's community education program. At this time, no information is available about how much funding the BEEP or Bitterroot Watershed Partnership will receive this year under the Large-Scale Watershed Restoration Program.

Other similar education partnerships are forming elsewhere around Montana, like in Missoula and Billings. One of the BEEP partners is now a regional representative for the state Montana Environmental Education Association. BEEP will make collective presentations at this year's annual Montana Environmental Education Association meeting. We are working with the state director of Montana Environmental Education Association to secure \$15,000 of grant funding to develop a state-wide searchable online directory for the State of Montana using the education assessment data collected for this project.

APPENDIX V. POSITION OF THE RESEARCHER - GRIPNE

I quickly learned that traditional research methods were not appropriate for this project. I attempted to join the group, have them fill out my survey, and move on to other things at the initial BEEP meeting. I knew that they needed a greater investment on my part in their work, and I needed to become involved with them over a period of time to make my research relevant to them. I opted for more of a participatory research approach, which uses research as vehicle to achieve social change and advocates a much deeper involvement of the participants in the research process. My role in BEEP was as a researcher and participant. In exchange for allowing me to attend the meetings, I offered to help write grants and organized a block of several meetings in the summer 2000. For example, one of the actors approached me about running an Aldo Leopold Workshop. We spent wrote and received a grant from the Montana Community Foundation. The Aldo Leopold Workshop was offered this past October and received great reviews. In the Spring 2000, I was awarded a Berkeley Ford Foundation Community Forestry Research Fellowship to support my participatory research in the Bitterroot Watershed.

APPENDIX VI. INTERORGANIZATIONAL COMMUNICATION - BEEP

The Bitterroot Environmental Education Partners is a classic case of collective action. Collective action refers to the ability of self-interested actors, groups, or firms to work together to achieve mutually beneficial goals they could not have obtained on their own. Successful collective action often results in the generation of public goods in the form of information and communication (Fulk et al. 1996). Advancements in technological innovations such as the internet, cellular phones, and database systems in recent years have increased the potential for collective action (Fulk et al. 1996).

Monge et al. (1998) apply public goods theory to strategic alliance interorganizational communication and information systems, emphasizing two measurable variables, which include connectivity and communality (Fulk et al. 1996). They identify the four types of alliances that could produce communication public goods that include a) precompetitive, b) competitive, c) joint value creation, and d) value chain.

They also distinguish between the production and maintenance of a public good, noting that most research in the public-sector public goods has been devoted to the production of public goods and the incentives required for a group of actors to be willing to contribute to the creation of public goods (Monge et al. 1998). Whereas research related to market-sector public goods has been less common and has focused on the maintenance of goods rather than their production (Monge et al. 1998). Issues concerning the maintenance of public goods associated with strategic alliance interorganizational information systems, like diluting information, infecting the system with viruses, and co-opting information, are just a few of the concerns that are being

researched.

Precompetitive alliances are strategic alliances that are intentionally designed to produce competitive conditions among the different actors (Yoshino and Rangan 1995). Often times these forms of alliances take the form of research and development among several firms or can be joint public-private ventures (Monge et al. 1998). Similar to precompetitive alliances are competitive alliances.

Competitive alliances refer to actors who are currently competing against each other in the market. In some cases the benefits of pooling information among competitors is greater than the cost associated with not pooling information (Monge et al. 1998). For example, actors like automobile insurance companies are willing to contribute their individual claims information into a database that is shared among all of the automobile insurance companies (Monge et al. 1998).

Unlike competitive alliances, joint value creation alliances refer to a group of actors that act like a team in developing a product or providing a service (Balakrishnan and Koza 1993, 1995). An example of a joint value creation alliance are the groups of actors like telephone companies, internet service providers, manufacturers, long distance companies, etc. who work together to provide satellite and broadband communications services (Fulk and DeSanctis 1998, Monge et al. 1998).

Finally, value chain alliances refers to alliances that invest in improving communication within their manufacturing process in order to reduce the overall transaction costs associated with a

final product (Monge et al. 1998). Monge et al. (1998) do note that not all alliances can create public goods. Those alliances that never attempt to create value jointly nor develop a communication network and are devoted to such tasks, as individual gain may not have the potential to produce public goods.

Monge et al. (1998) categorized the types of public goods into two main divisions of connectivity and communality. Connectivity refers to the ability of the firms to directly communicate with one another through information and communication systems (McQuail 1987, Fulk et. al 1996). A fully connective system is one where each firm has the ability to contact every other firm in the strategic alliance. Optimal connectivity refers to a level of connectivity where the marginal cost equals the marginal benefit resulting in a situation where most firms have direct contact with each other. Connectivity can be spilt into the two main divisions of physical and social connectivity. Physical connectivity refers to the actual infrastructure that supports direct communication, whereas social connectivity refers to the actual use of the physical connectivity by a firm. Physical connectivity describes attributes like a computer listserv. Social connectivity is a measure of interdependence among firms as to whether or not the firm actively participates in the listserv.

Communality is the availability of a commonly accessible pool of information to the different firms. Communality is created when firms store and exchange informational databases.

Communality is optimal when systems create an informational marketplace. Greater participation and sharing of complete information results in high communality. However, when the information shared is clustered, the only required participation is that by the firms that

control the clustered information (Fulk et al. 1996 and Monge et al. 1998).

Monge et al. (1998) warn not to confuse the actual interorganizational communication information system as the public good with the real public good. The real public good is the actual functionality that the interorganizational communication information system provides.

In their attempt to define principle elements related to collective action, Marwell and Oliver (1993) identified four key factors from public goods theory: characteristics of the good, participants, collective group of participants, and action processes (Monge et al. 1998). Characteristics of the good refer to qualities such as if the good or service is discrete or continuous, or if the good is valuable only as a whole or while being developed. Like characteristics of the good, the characteristics of the participants refer to the interests of the actor or actor representing the firm in the production and maintenance of the public good (Monge et al. 1998). Information about the group size and variance is some of the more important information related to the characteristics of the collective group of participants. Characteristics about the action processes describe the degree of interdependence among the firms and their ability or inability to produce the public good (Monge et al. 1998).

The production of an interorganizational communication information system will be successful when the benefits outweigh the costs. Some of the costs associated with producing and maintaining an interorganizational communication information system include the start-up (nonrecurring) and maintenance costs (recurring). Start-up costs include hardware, software, time, and the political cost associated with generating support for the project. These costs

diminish over time, whereas recurring costs continue indefinitely. Recurring costs include costs associated with resources required to use the system as well as maintain the resource (Monge et al. 1998). Those firms who stand to benefit the most from the production of the resource are more likely to make sure that the necessary steps are taken to ensure production of the public good. The potential negative effect of equitable benefits is that no one actor or group of actors will have enough motivation to see the project through (Fulk et al. 1996).

In many ways, conservation education organizations operating independently in the Bitterroot Watershed demonstrate many of the characteristics of a competitive alliance. However, the emergence of BEEP as an interorganizational alliance for the purposes of sharing information, avoiding duplication, and working towards partner projects are characteristics of a value-chain alliance. While hiring a part-time BEEP coordinator to develop a 5-year spearhead a community education workshop that highlights the each partner's program and watershed education plan are not public goods in an of themselves. They are essential steps to developing a comprehensive long-term environmental education strategy that will lead to changes in behavior in the public and ultimately a more sustainable way of living.

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Appendix VII. Environmental Education Organization Missions and Program

Descriptions

Bitterroot Audubon

EE Provider Mission Statement / Purpose

The purpose and objectives of this society shall be to engage exclusively in any such educational, scientific, literary, historical, and charitable pursuits as are set forth in its Certificate of Incorporation, if any, and/or are the purposes and objectives of the National Audubon Society, Inc., (hereinafter called NATIONAL SOCIETY), of which this society shall function as a Chapter, and said purposes and objectives shall conform to the provisions of Section 501(c)(3) of the Internal Revenue Code.

Monthly Public Lecture

Eight times during the fall, winter, and spring we invite speakers to talk about wildlife and conservation. Lectures are open to the public

Field Trips

- The Second Saturday in May is the International Migratory Bird Count Day (May Count).
- December brings the Christmas Bird Counts in Hamilton and Stevensville. Dates vary
- Three times a year we clean 2 miles of Highway 93. Dates vary

Kid's Mist-netting Day at Kiwanas Park

Mist nets are used to capture live birds and bird specimens are used to talk about bird adaptations

Bitterroot Ecological Awareness Program

EE Provider Mission Statement / Purpose

TOPS – Teen Outdoor Program. This is a four-year program that provides outdoor activities like rafting for at risk youth into the wilderness teaching them about good decision-making, leadership, and team building.

EEP – Environmental Education Program. This program provides speakers for schools and other activities teaching stewardship using local resources like ranchers, farmers, and artists about the environment of which they live.

CEAP – Conservation Education Association Program. This manual will provide Bitterroot Valley K-12 interdisciplinary benchmarks for the classroom; tailoring activities to our local ecosystem.

Bitterroot National Forest

EE Provider Mission Statement / Purpose

Connect people to the land by working with partners to provide the public with the tools, experiences, and information they need to understand the natural world and in turn make informed actions / decisions related to sustaining natural and cultural resources.

Interactive Displays for Local Events

Bitterroot National Forest Supervisor's Office has several interactive displays that serve to inform onlookers about such topics as forest and fire ecology, plant and animal natural history, and much more.

Lending Library

The Bitterroot National Forest Supervisor's Office has many learning resources like videos, books, and trunks available for teachers and non-formal educators to check out.

Field Trip

Forest service personnel will accompany classes at designated field sites and present a series of potential field activities like fire ecology, plants, animals, as determined by teachers and forest management activities.

Wilderness Skills Trail

Employees promote awareness, understanding, and appreciating of cultural, environment, and history. Fifth and sixth graders rotate through stations located on a trail in Charles Waters's area stations.

Community Outreach Presentations

Bitterroot National Forest Education Website

This website is designed to be a resource for K-12 classroom teachers who want to access useful resources and lesson plans to use with their students. Topics range from biology to environmental science with several resources devoted to fire ecology.

Monitoring / Restoration Activities

School groups and service groups can "adopt-a-site" to do long-term water quality, vegetative recovery, wildlife and bird populations, etc. monitoring and possibly restoration.

Brochures

Brochures will provide information that addresses visitor and public general interest about forest, fire, natural history, ecology, as well as management about Bitterroot National Forest program and land. Bitterroot National Forest is also developing an audiocassette chronicling the fires of 2000 as traveled from Lost Trail Pass to Hamilton.

Lee Metcalf National Wildlife Refuge

EE Provider Mission Statement / Purpose

To manage habitat for a diversity of wildlife species with emphasis on migration birds and endangered and threatened species and to provide compatible human benefits associated with wildlife and wildlife. Also see attached mission of NWR System.

Field Trips at Lee Metcalf National Wildlife Refuge

Field Trips at Lee Metcalf National Wildlife Refuge offers field trips in EE with a focus on bird migration and wetlands for all grade levels. There are also a variety of field trip materials including binoculars, bird books, a spotting scope, water nets, insect nets, waders, and natural history skins and skulls for groups to use and study. The Refuge's Wildlife Viewing Area provides 2 ½ miles of nature trails, with a half-mile wheelchair accessible trail. Excellent viewing of migratory waterfowl and other birds can be observed in their natural habitat via the Waterfowl Lane that goes through the Refuge. Peak migration periods occur between March-May and September-October.

Interpretive Program

Periodic 2-3 hour interpretive nature walk that is based primarily on birds are held on Saturdays throughout the year. The annual event called "Welcome Back Waterfowl Day" kicks off the return of migratory birds to the Bitterroot Valley. Representatives from Bitterroot Audubon and Bitterroot National Forest also participate.

Youth Fishing Clinic

The clinic is put on in partnership with BigSky Bassers and Montana Fish, Wildlife, and Parks and educated youth ages 7-12 about ethics, techniques, management, biology, with adult mentors go out to the Refuge's fishing ponds and fish for small mouth bass.

Migration Mania Festival

Migration Mania Festival is a two-day community festival to celebrate the return of migratory birds to the Bitterroot Valley of Montana. The goal is to expand people's awareness of migratory birds and inspire an interest in ensuring their existence for future generations. This goal is accomplished through activity stations, field trips, children's activities, exhibits, and special presentations with a focus on bird migration. Migration Mania Festival occurs the third Saturday of every May.

Hunter Safety Education

Two gun hunting and one bow hunting safety education courses will be hosted by the Refuge throughout the year. These courses support the Refuge's hunting program and will be taught in cooperation with Montana Fish, Wildlife, and Parks.

Environmental Education Library

Natural and cultural history materials are available through checkout at the North Refuge Valley Library. Materials are categorized by topics such as birds, mammals, plants, geology, pollution, etc.

Students Teaching Other Kids Ecological Dynamics (S.T.O.K.E.D.)

Stevensville high school students create interactive science-based programs related to natural history of Lee Metcalf National Wildlife Refuge and present them on scheduled field trips for elementary students in the Bitterroot Valley. It is a semester-long project for high school students and field trips are held during April and May. These classes are available first come first serve. Interested people should provide the following information: desired date w/ alternative, class grade, class size, teachers name, school name, phone, and address.

Montana Jr. Duck Stamp Contest

Montana Federal Jr. Duck Stamp Conservation and Design Program is a dynamic active art and science curriculum designed to teach waterfowl and wetlands conservation to students in K-12. The program culminates in the student's final rendition of a North American duck, goose, or waterfowl that is entered into a contest and judged by a distinguished panel of wildlife experts and artists.

Kid's Waterfowl Hunting Clinic

One-day even where youth rotate through learning stations designed to increase awareness about technique and ethics in waterfowl hunting. Some stations include waterfowl ID, working with retrievers a virtual hunting, etc. stations are lead by representatives from Lee Metcalf National Wildlife Refuge, Montana Fish Wildlife & Parks, Ducks Unlimited, and Volunteers.

Lolo National Forest

EE Provider Mission Statement / Purpose

Dead Trees or Snags and Bird Adaptations

Classroom programs for grades K-6th to explore how birds are adapted to their environment (use of bird study skins and parts). Also covered is the value of dead trees (snags) to wildlife, particularly, birds.

Fire Ecology Education Web Pages

Text, photos and illustrations that cover forest ecology and how plants and animals are adapted to fire.

Fire Ecology Education Field Trips

Full, one-day field trips to recent post-fire areas on the Lolo National Forest. Pre and post classroom visits and curriculum; one class/field trip for 5th grade. 3-4 stations on plant and animal adaptations to fire and watershed effects.

Bird Watching Field Trip

For grades 1-6 at a site nearest each school. Students learn basics of bird watching and bird conservation. Binoculars are available for every student in one class.

Nature Walk Week

Field trips for 3rd graders in the Missoula area. Field trip to Maclay Flat/Blue Mountain or Rattlesnake Recreation areas to learn about forest and wildlife ecology and anthropology. Reaches more than 500 students with more than 20 professional instructors from forest service and area biologists.

Montana Audubon

EE Provider Mission Statement / Purpose

Montana Audubon strives to create a culture of conservation and be recognized as a leader in environmental education in the state through its community-based education program. We seek to foster an environmentally literate citizenry possessing the knowledge, appreciation and emotional connection to our landscape. We are committed to connecting people to the history and inhabitants of the land and the natural systems and processes that maintain its health. Our programs shall inspire and promote personal ecological values and a commitment to conservation behavior, and provide the knowledge, skills and tools for people to take informed action for the benefit of wildlife.

Montana Audubon Mission is to enable Audubon's members in all chapters across the state to work together to conserve and restore Montana's natural ecosystems so they will continue to nourish birds, other wildlife, biological diversity and the human spirit for future generations.

Montana Audubon Educational Guiding Principles:

Montana Audubon's education program is guided by the following six principles:

Outdoors: Research show that direct experiences in nature are the single most important factor in developing conservation values. Active experiential learning in nature is the best approach to environmental understanding.

Interactive, Inquiry-based: At Audubon we believe in learning by doing, teaching through active participation, engaging participants in a physical and intellectual exploration of the natural world.

Community-based and Regionally Focused: Audubon will work in partnership with local individuals, schools, and organizations, to be a part of these communities, in order to shape our education efforts and achieve our conservation goals. Audubon seeks to foster a personal connection to the eco-geographic area--the home landscape where we live.

Science-based/Integrated Interdisciplinary Approach: Our connections and commitments to conservation are engendered along many paths. Audubon's education programs must be scientifically accurate while embracing and integrating many disciplines both in the sciences and the humanities.

Personalized: The Audubon Experience is an intimate one, ideally with no more than 10 participants per leader. Interactions with participants should be personalized, seeking to accommodate a diversity of learning styles and ability levels.

Leading to Action: To affect conservation, Audubon's programs inspire and promote personal conservation behavior. We must provide the knowledge, skills, and tools for people to take informed action for the benefit of wildlife.

Audubon Centers

National Audubon is committed to establishing a network of 1,000 conservation/education centers throughout the country. An Audubon Center is a community-based program located on protected land that is used by Audubon and our partners to save land and to engage people in environmental education and conservation action. Centers will be permanent institutions in the community that teach conservation values and serve as local hubs for conservation action. Like schools, churches, libraries or museums, these Centers will be part of the community, will be supported by the community, and will add real value to the community. Here in Montana we will have two Audubon Centers by the year 2006.

Community Naturalist Program

This is a great way for Montana Audubon to connect with local communities. By training and working with local naturalists, we are able to develop programs that are of local interest. Audubon's Community Naturalist works closely with schools and community groups, assisting in the study of birds and other natural history topics both in the classroom and in the field.

The Family Naturalist Program

Children and their parents and grandparents learning together are the focus of this program, which offers a series of one and two day nature workshops throughout the year. Themes include beginning bird watching, animal tracking, owls, edible wild plants and mushrooms, butterflies, nature in winter, trees, and art & nature.

Birds Beyond Borders

This international program connects classrooms in Montana with classrooms in the Oaxaca region of Mexico through the study of migratory birds. Students exchange news of bird sightings, letters and artwork throughout the year, and teachers in each country have an opportunity to visit their sister schools.

The Songbird Kit

In partnership with Wild Wings and our colleagues in Mexico, a Latin American version of the Songbird Kit, popular in the U.S., has been created to reach classrooms and community groups throughout Mexico.

Audubon Adventures

Audubon Adventures is a student newspaper and teacher's guide, produced by the National Audubon Society. Thanks to the sponsorship by local Audubon chapters, over 6000 students in more than 300 classrooms across Montana receive Audubon Adventures.

Classroom BirdWatch

Classroom BirdWatch is a series of interactive interdisciplinary science curricula for elementary and middle school students based upon Citizen Science projects underway at the Cornell Lab of Ornithology and the National Audubon Society. In these projects, citizens across the continent make important contributions to science by collecting data about their local birds and sending the information to scientists who study bird populations and develop bird Conservation programs.

The Montana Ecosystem Management Learning Center

EE Provider Mission Statement / Purpose

The MEMLCP will provide leadership in collaborative conservation education and demonstration efforts aimed at management of Montana's diverse ecosystems in the new millennium.

We will provide new learning opportunities on the interaction of people with forest and range ecosystems, promote cooperative ventures, and improve understanding of ways ecosystem dynamics and human interactions influence our world.

Rationale: Although numerous mediums exist pertaining to the use and future of forestlands, few opportunities exist outside National Parks where people can interact with, and learn about Montana's diverse forest and ecosystems and visualize management options. Across Montana, hundreds of unique forest conditions exist, further complicated by different styles and philosophies of management. Our learning site will help people learn about this complex ecosystem and the role that different management practices may have to conserve these resources.

Learning Center News

This is the MEMLCP's newsletter. It comes out two times a year; once in the late spring or early summer and once in the late fall. Individual issues cover upcoming events, new resources, meeting highlights, member's activities, and EM resources and programs developed by MEMLCP.

Forest Management Unit

This two-week study unit was designed to help middle school teachers integrate what they already teach students about wildlife, soils, and riparian areas/streams into a real life forestland use and management unit (choices and decision-making). Students use what they review and learn about wildlife, soils, and streams to learn how economic, social, and legal concerns may be incorporated into management decisions to create a management plan for a local piece of Montana property.

Teacher Training- Montana Forest Ecosystems and Ecosystem Management

Participants will be led through a discovery of the diversity of Montana forests and the processes that maintains them the first day. The second day will focus on explaining management actions aimed at simulating and or maintaining natural processes and overviews of a variety of management perspectives and goals. New forestry curriculum and materials will also be available for review.

Montana Ecosystem Management Learning Center Program Web Page

This web page provides information on the MEMLCP's mission, goals, learning site facilities and contacts, upcoming events, EM resources, EM in general, and newsletters.

Forest Watershed Issues Field Trip Model

This model tells resource specialists and teachers how to create a unique trip that: 1) integrates

social, legal, ecological, and economical aspects of land use planning into one trip, 2) partners resource specialists and educators in a hands-on field trip 'station' design, 3) raises student's awareness of TMDL's, 4) integrates collaborative stewardship with management planning and conservation education, 5) meets school and environmental education standards, and 6) discusses practices that help conserve range, wildlife, soils, vegetation and water resources as we use the land.

Montana Forests Forever CD Rom

This interactive CD-Rom provides a fun and captivating presentation of Montana's forest ecology including wildlife, forest products, the scientific principles based on natural forest processes that forest managers use to sustain our forests and forest recreation. Highlights include a moving panorama of a virtual forest that includes video clips on how forests change with elevation and direction, and which animals use each of these specialized forest types. Student opinions of forestland uses are also included.

Forest Stewardship Educational Trunk

The goals of this trunk are to develop student awareness and understanding about forest ecology and the social, political, economic, and ecological concerns affecting land management and sustainable forestry practices. Students will conduct investigations of forest resources and develop a management plan and stewardship project for the forestland they investigated. The trunk will contain forest measurement tools, curriculum activities and background information and resources geared toward 5-8th graders. This trunk was developed by a committee of educators, resource specialists, private landowners, loggers, and other interested parties in order to give it a balanced perspective.

Learning Sites and Guide to Ecosystem Discovery

Members of the MEMLCP operate two learning sites that include a variety of forest ecosystems and educational trails, field trips, research data, resource specialists, and other resources, including maps and aerial photos. We will be compiling a guide to ecosystem discovery that includes a map of easy access viewing points for maintaining diverse ecosystems and site information, including events, facilities, contact people, directions, and nearby accommodations. The guide's purpose is to outline the many diverse forest ecosystems that exist across Montana as represented by our learning sites, briefly describe what makes each ecosystem unique in the context of the natural role of fire, historical importance of Native Americans and Lewis and Clark, and current multiple use practices.

Montana Natural History Center

EE Provider Mission Statement / Purpose

To foster understanding appreciation and conservation of natural systems through natural history education in the Northern Rocky Mountains.

Spring After School Programs

Nature Adventure Play Program. Are your kids looking for something fun to do after the school day ends? Nature and imagination go hand-in-hand for children who participate in our adventure play programs. Kids can create a world of their own at our Nature Adventure Playground. Building, planting, painting, and just being kids -- it's a great way to let children explore nature and themselves in an adventurous environment. Participants will go on nature walks, build birdhouses, play games, and plant gardens.

Restoration After-School Program. Come play games, learn about natural history, and help restore habitats for animals living near Fort Missoula. Imagine what it would be like to be a butterfly living in a prairie, or a bird building a nest in a forest

Summer Day Camps

Week-long day camps are offered throughout the summer for children from 7-10 years old, and each focuses on some aspect of natural history. Six camps are offered, and include: feathered friends, nature detectives, wetland wonders, magnificent mammals, streamkeepers, and tracks and traces.

Summer Science Classes

Week-long day camps are offered throughout the summer where the emphasis is teaching basic science concepts, encouraging inquiry, nurturing the art of careful observation, and striving to instill in each student a sense of interdependency and responsibility for the environment. The target age varies for each class. A total of 12 courses are offered: art and anatomy of birds; living wild in the city- MUD camp; lynx and hares; fire science; frog field camp; basically bears; animal fun and fiction; bear facts and bear tracks; Dig it! Adventures in archaeology; forensics; and casting and tracking.

Professional Conference Field Trip

Trunks

Traveling education kits help make natural history come alive for your classroom. Each kit is filled with interdisciplinary and scientifically-accurate educational materials such as grizzly hides, wolf skulls, age-appropriate lesson plans, posters, videos, audio cassettes, games and puppets. They are sent statewide to Montana teachers, reaching over 2,000 students annually.

Sixteen trunks are available: air care, all about amphibians, Clark fork watershed, fireworks, fungal jungal, geospatial, gizzly bears, living with winter, mount jumbo, pond life, prairie ecosystem, songbird blues, threatened and endangered species, wilderness and land awareness, wolves and humans. A trunk for glacial lake Missoula is currently being developed.

Riverfest

Riverfest is designed to enable people to spend the afternoon at the Nature Center taking a guided walk by the river, learning about how to attract birds to your yard, listening to music, or taking a garden tour. There are also exhibits and kid's activities.

Field Notes

Field notes was developed as four- to five-minute oral presentations about some interesting aspect of the natural world to read on KUFM, the public radio station based at the University of Montana. The purpose of the on-air snippets is to make biology interesting and understandable to the general public.

Elderhostel

Seniors 55 and older -- Join the Nature Center at Fort Missoula's Elderhostel programs for a season of education and adventure! Located in the Rocky Mountains "Five Valleys," Missoula has a wealth of history, culture, scenery, and wildlife. It is minutes from the Lewis and Clark Trail, wilderness and recreation areas, and an easy drive to Glacier and Yellowstone National Parks and the National Bison Range.

Center Visits

Visiting Naturalist Program

Beginning Fall 2001, The Nature Center will offer area schools the Visiting Naturalist Program of classroom presentations and field trips in the natural science areas of River Life Watch, Fire and Water, and Restoration Ecology. This instruction is based on our MNHC trunks and curriculum and meets national and state science education standards. It provides students with enriching hands-on experiences with nature and exciting opportunities to develop a greater understanding of scientific processes in their backyards. The program includes pre/post investigations, instruction, classroom materials, and some transportation.

Exhibits

Live Amphibians and Reptiles. A new attraction is our roomful of amphibians and reptiles. Designed for a booth at the Western Montana Fair, this display took first place for commercial exhibits! It is now housed permanently at The Nature Center. The cool water creatures include a painted turtle, garter snake, long-toed salamanders, woodhouse toad, western toad, and a tree frog. Stop by to check out this award-winning live exhibit!

Nature Trail

Visitors to The Nature Center can enjoy Stevens Island on our self-guided Native Plant Trail. Stroll along the Bitterroot River and learn about various plants and how they have historically been used by the Salish/Pend Oreille people. With 15 interpretive markers, the trail is both interesting and educational. Bring along the binoculars to enjoy the wild birds that make Stevens Island their home!

Zoological Collection

The Nature Center at Fort Missoula is honored to house a portion of the Philip L. Wright Zoological Museum and pleased to be working with the University of Montana to make the

collections accessible for viewing. In addition to our in-house exhibits, the Montana Natural History Center provides tours of the Bird and Mammal Museum's main collection at the University of Montana for schools and other interested groups. This collection of over 12,000 mammals and 6,000 birds stands out among collections in the Northern Rockies region because of the total number of species represented and the breadth of the museum's holdings. And this time you need no binoculars to see the birds up close!

Ice Age Mammals of Montana

George Stanley, a professor with the University of Montana Geology Department, and intern Becki Braun worked with us this spring to create an Ice Age Mammals of Montana exhibit. The Nature Center has displays of fossilized plants, fish, insects, and invertebrates, and the story about how animals and plants are fossilized.

Glacial Lake Missoula

Related to the Ice Age exhibit is The Nature Center's Glacial Lake Missoula display, which explains the flood process and shows photos of the impact of the rapid draining of Glacial Lake Missoula. For additional details about the Ice Age Floods.

National Wildlife Federation

EE Provider Mission Statement / Purpose

The mission of the National Wildlife Federation is to educate, inspire and assist individuals and organizations of diverse cultures to conserve wildlife and other natural resources and to protect the Earth's environment in order to achieve a peaceful, equitable and sustainable future.

Schoolyard Habitat

In 1996, the Schoolyard Habitats Program was created to meet the growing interest and distinct needs of schools in creating and restoring wildlife habitat on school grounds. The Schoolyard Habitats Program focuses specifically on assisting school communities in the use of school grounds as learning sites for wildlife conservation and cross-curricular learning. Through our Schoolyard Habitats certification program, we recognize the accomplishments of, and foster networking among, innovative school communities nationwide.

Backyard Habitat

The Backyard Wildlife Habitat program was started in 1973 by the National Wildlife Federation to acknowledge and encourage individuals who garden for wildlife. We formally acknowledge your efforts with a national certification program. The program encourages everyone - homeowner, teacher, and community leader - to plan their landscape with the needs of wildlife in mind. Today, with over 23,000 sites certified in the program, NWF provides information and assistance not only to homeowners, but also to schools, businesses, and community groups that are interested in creating wildlife and environmentally friendly landscapes.

Keep the Wild Alive

The National Wildlife Federation's Keep the Wild Alive™ program is an ambitious endangered species campaign that aims to build support for endangered species, engage the public in species conservation efforts, and move several imperiled species closer to recovery. Launched in December 1998 on the 25th anniversary of the Endangered Species Act — our nation's premier wildlife protection law — the Keep the Wild Alive campaign highlights 25 specific endangered species. These species illustrate the diversity of imperiled species and put a face on a variety of important issues in endangered species conservation, from habitat conservation to consumer choices.

Campus Ecology

In early 1989, National Wildlife Federation challenged colleges to support Earth Day 1990 by starting environmental programs on campus and in the community. By summer, the Campus Ecology Program had been established to work with college leaders and develop resources to help meet the challenge. Ten years and over 2,000 projects later, Campus Ecology continues to grow and move into new areas.

Primary Goal is to reduce the need to "reinvent the wheel" of environmental action from campus to campus. Our staff communicates to campus organizers what other environmental leaders have learned through phone and e-mail consultations, site visits, workshops, conferences, and a variety of other tools available to enrolled campuses.

Our Mission is to assist students, faculty, staff and administrators in transforming colleges and universities into learning and teaching models of environmental sustainability, by assisting with the design and implementation of practical conservation projects, providing training and incentives, and helping to document and share lessons learned nationally and beyond.

Nature Link

Youth and teens learning about nature in their neighborhoods, and making a difference through community-based conservation. Summer camps, run by the Wilderness Education Institute, are offered in leadership training and teen adventure. To extend their reach, NWF works with a limited number of independent organizations that serve as official NatureLink hosts. Hosts use NWF materials and program models to introduce youth, teens and their families to the natural world through hands-on outdoor activities. Hosted programs vary in length, ranging from day or weekend family programs, to ongoing youth and teen programs.

Raptors of the Rockies

EE Provider Mission Statement / Purpose

Raptors of the Rockies is a non-profit 501(c)(3) raptor education and rehabilitation project located in Western Montana. Active since 1988, our mission is: to assist injured and/or orphaned raptors with the ultimate goal of returning them to their natural habitat and to provide a lifetime of quality care to permanently disabled birds of prey; to educate schools and the public through the use of live birds such as eagles, hawks, falcons and owls in raptor education and wildlife art programs; to instill a sense of respect and admiration for these skilled hunters and to promote wildlife conservation and habitat preservation for our wild bird populations.

Falconry

Presentations on this ancient sport have been a highlight of our programs over the years. The terminology, history, and techniques of Falconry are discussed but not promoted. Kate Davis holds a General Falconry permit and has experience with falcons, accipiters and buteos.

Birds In Art

Live birds are the greatest of models to render in art. With a Hawk, Eagle, and Owl serving as live models, this program begins with a presentation on avian anatomy and function and is followed by sketching, painting or clay sculpting sessions that include discussions of the characteristics key to rendering each species.

Rocky Mountain Elk Foundation

EE Provider Mission Statement / Purpose

The mission of the Elk Foundation is to ensure the future of elk, other wildlife and their habitat.

In support of this mission the Elk Foundation is committed to:

Conserving, restoring and enhancing natural habitats;

Promoting the sound management of wild, free-ranging elk, which may be hunted or otherwise enjoyed;

Fostering cooperation among federal, state and private organizations and individuals in wildlife management and habitat conservation; and

Educating members and the public about habitat conservation, the value of hunting, hunting ethics and wildlife management.

Teller Wildlife Refuge

EE Provider Mission Statement / Purpose

In order to provide a place free from development to learn, recreate and rest, Teller Wildlife Refuge, Inc. is dedicated to conservation management, education and research that preserves, protects and enhances the land.

Field Trips for Local Schools

Teller offers a variety of field sites to local schools and youth groups for hands-on outdoor field trips. Each year, more than 3,000 students and teachers visit Teller for outdoor learning opportunities, engaging in direct experiences with local organisms and environments. The TWR education staff provides assistance and resources to teachers for their field trips. Small group and integrated learning are encouraged. A wide variety of themes are studied on our riparian sites of ponds, river, streams, fields, and woodlands.

Teller Wildlife Refuge Teacher Workshops

An important goal of our teacher workshops is to prepare teachers for planning and carrying out their experiential field trips on the Refuge. The workshops also enable teachers to see the Refuge environment in a larger ecological context. Workshops are offered for University of Montana graduate credit or OPI Renewal Units, depending on length. Workshops scheduled for 2001 are listed below. For additional workshop information or to register, call the Teller Education Program at 406-961-8346 or send email to educate@tellerwildlife.org

Field Trips with Volunteers

Teller offers many opportunities to get involved in leading and assisting on outdoor field trips at TWR. Volunteers learn about a variety of natural history, topics as they help cultivate an appreciate

Teller Wildlife Refuge Resource Library

Teller Resource Library offers several books available for checkout for volunteers and educators who are involved in our education program. The library includes books on environmental education and the natural history of plants, animals, and ecology. We are happy to announce that a generous volunteer recently donated publications, a curriculum guide, a video, and a giant poster all about bats to the TWR Education Program.

Clark Fork Watershed Education

This education kit gives students grades 3-6 a glimpse of the function and complexity of a local watershed, offering ideas of how they can have a positive effect on water quality. The kit contains a comprehensive curriculum and is full of activities and resources. The Bitterroot Conservation District wrote the grant to purchase this Montana Natural History Center kit; where it will be housed in the Bitterroot is soon to be determined.

Service Projects

There are many opportunities for volunteers to learn about a participation in stewardship of our natural resources. There are a few ongoing projects such as fence removal, restoration, monitoring, that require the help of volunteer groups. There are also 2 volunteer projects per

year Spring / Fall where individuals can help on the Refuge by lending a hand for a couple of hours.

Bitterroot River Access Clean-Up Day

Bitterroot River Access Clean-Up Day is a program that asks citizens who utilize public accesses to express their appreciation by protecting, cleaning and maintaining these accesses. The event is organized around Earth Day, National Volunteer Week, and Youth Services Days, and offers a participatory project in honor of those celebrations.

Environmental Writing Institute

Teller Wildlife Refuge of University of Montana Environmental Studies Program sponsors a weeklong environmental writing workshop at Teller Wildlife Refuge, Environmental Writing Institute. Since 1990, the Environmental Writing Institute author has worked with writers in the workshop shares with the community the importance and positive effect that environmental and nature writing has on the future of our community-locally nationally, globally.

University of Montana

EE Provider Mission Statement / Purpose

The mission is to educate environmental education professionals at the pre-service and in-service level, to implement the primary goal of environmental education, which is to promote environmentally responsible behavior

Graduate Program

Graduate students enroll in Environmental Studies, Education, or Forestry; take core courses in their departments, electives in environmental education, and research or projects including environmental education.

Watershed Education Network

EE Provider Mission Statement / Purpose

Fosters knowledge, understanding and appreciation of watershed health. Assists area schools in their stream-monitoring projects by providing monitoring equipment, resource professionals, as well as volunteer recruitment, training and coordination. Offers workshops for teachers and citizens to learn stream monitoring and watershed health concepts. Offers stream tours for the community. Offers fall and spring workshops for teachers and citizens and wetland and riparian area tours for the public.

Other Conservation Education Organization in the Missoula and Bitterroot Watershed to Potentially be Surveyed

Aldo Leopold Wilderness Research Institute. A federal research program that provides scientific leadership in understanding the human and ecological values associated with wilderness protection. 790 E. Beckwith Ave. 542-4190.

Alliance for the Wild Rockies. Works to secure the ecological integrity of the Northern Rockies bioregion through citizen empowerment and the application of the conservation of biological sustainable economic models and environmental law. Box 8731, Missoula, 59807. 721-5420.

Five Valleys Audubon Society. Field trips to observe wildlife and monthly programs on wildlife and conservation topics. Contact Larry Weeks, 549-5632. Birding hot line: For unusual sightings, call 721-9799.

Five Valleys Land Trust. Director Wendy Ninteman, 549-0755, Box 8953, Missoula 59807. Five Valleys is a nonprofit organization dedicated to protecting wildlife habitat, riparian areas, natural areas and open spaces in and around Missoula.

Great Bear Foundation. Dedicated to helping all eight species of the world's bears. Publishes a quarterly publication, "Bear News." Conducts school programs, and makes bear presentations to other groups. 802 E. Front St., Missoula 59802. 829-9378. Charles Jonkel, president; Aya Tanigami, office manager. E-mail: gbf@greatbear.org.

International Wildlife Film Festival / International Wildlife Media Center. Organizes the annual film festival in Missoula in mid-April. Strives to bring the best wildlife films from around the world to the Missoula festival; works to be a watchdog over the quality and accuracy of wildlife films. Makes films available to schools, organizations and other audiences through a post-festival tour and video library. The International Wildlife Media Center teaches about wildlife media, promotes higher-quality productions, creates new markets, trains young people and newcomers to the wildlife-film industry. Janet Rose is festival and media center director; Katie Fernandes is festival coordinator and Lisa Kerscher, communications coordinator. 27 Fort Missoula Road, Missoula, 59804. 728-9380. Website: www.wildlifefilms.org. E-mail: iwff@wildlifefilms.org.

Montana Environmental Information Center. A statewide advocacy and research organization, MEIC was founded in 1973 to protect and restore Montana's natural environment. MEIC lobbies the state Legislature, monitors state government, educates the public about environmental issues and provides citizens and communities with organizing and technical assistance. Visit www.meic.org. Contact Graden Oehlerich at 721-3589 or graden@montana.com. 114 West Pine Street. State office phone is (406) 443-2520.

Montana Native Plant Society. Meets monthly from September to May on the second Thursday of the month. Meeting places and times are announced in the Missoulian. Box 8783, Missoula, 59807-8783.

Montana Trout Unlimited. Promotes conservation of wild trout and trout habitat nationwide. Bruce Farling is the Montana executive director. 240 N. Higgins Ave. 543-0054.

Save Open Space (SOS). An urban land trust dedicated to the preservation of open space in and around the greater Missoula area. Acquires donated conservation easements; promotes awareness of the values association with open space in the community, through education and advocacy. 1916 Brooks, PMB 352, Missoula. 549-6083. Fax: 543-1128. E-mail: sos_missoula@yahoo.com.

Wild Rockies Field Institute. An independent nonprofit educational organization that offers field-based courses for college credit. The group's mission is to teach critical thinking about social and environmental issues, foster understanding and respect for natural and human communities, and cultivate a sense of place that encourages personal, social and environmental responsibility. Contact Laura Sherubel at 549-4336.

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